17: Collocott M-5 (no date) 1923
OU9 Tonga OU9

is dangerous. The practitioner, when he has finished his treatment, carefully puts his basket or little bundle of medicine away in the shade, perhaps in the fork of a tree in the bush—it should not be left in the sun; and then he washes his hands. The owners of healing secrets generally guard their knowledge pretty jealously, and some virtue resides in themselves. It would be useless, if not dangerous, to steal anyone's medicine, but the prescription will be effective if properly bestowed by one person on another. There do not seem to be, however, any special ways of gathering the barks and leaves used, though I have been told of a medicine whose base is a bark which must be scraped from the tree when the rising sun shines upon it, and there is another in which leaves are cut down the middle, and the right halves thrown away and the left used.

In addition to the ordinary massaging there are gentle strokings, some of which appear rather mysterious in their operation. A white man, young and alert, told me that he had a painful swelling on his back, like a blind boil. An old woman came to him equipped with a concave sea-shell with a hole bored through the middle. She lightly outlined with the edge of the shell a square round the swelling, and then placed the shell, hollow side downwards, on the swelling, and gently stroked the shell. There was immediate relief and improvement; the trouble was much better next day, and quite cured in three days.

Less mysterious, and less effective than the white man's stroking the back of a shell, is the practice of holding the stomach of anyone suffering from abdominal pains. The shooting pains caused by wind give rise to much alarm. It is thought that vital parts of the body are leaping out of place, and, quite logically, the friends of the patient seek to hold the restless organ in its proper position. To the Tongan, Europeans probably seem rather heartless in leaving the sick alone as much as they do. Tongans are continually doing something for the patient, holding his head, or massaging his stomach, or what not. It would be very worrying to a sick European, though it must be admitted that much of the stroking and rubbing is extremely soothing. I have known a woman in difficult labour to have all her pains instantly relieved by the gentle pressure of an old midwife's hands.

Toothache, which must be more common now than it was once, is the subject of controversy. Some hold that it is caused by the boring of a little animal, whilst others maintain that it is just a sickness. So far as I have heard the evidence the partisans of the borer theory seem to have the stronger case, as a girl told me that she had herself seen a grub in a man's hollow tooth.

Children's illnesses are often attributed to "remembering," that is pining for an absent relative. A child is ill; remedies are tried in

The Village and the Research Scene

101 The village selected for research is on the main island of the
103 Tonga group, Tonatapu. Its name is Puke (pronounced Pookay, please).
[361] Gifford (1926: 196) in his catalogue of Tongan place names enters Puke as the gloss of fortress.^A However, the term has several seemingly unrelated definitions in the Tongan language; the villagers thought the name referred to a small hill in the village as the term denotes the small hill above a planted yam. The village is located about 3 miles
[361] west of Nuku'alofa; it is 1/4 mile from the main road going west from
[131] Nuku'alofa and about twice that distance from the lagoon to the north (See Map 2).

133 The terrain of the village and surrounding lands is flat and low-
361 lying. Village boundaries are easily distinguishable as fallow, and
[241] producing garden plots stop abruptly at the perimeters of the village compound. For some purposes the village and its population are divided into three geographically defined sections. The sections are the eastern section (vahe hahake), the central section (vahe loto), and the western section (vahe hihifo); the sections are under the leadership of the noble, the church steward, and the town officer, respectively.

361 Within the village are small patches of low-lying bush and many
245 trees have been left standing or planted; most prominent among the latter are the coconut palm (niu), breadfruit (mei), mangoe (mango), and tje tava amd 'ifi trees. Many of the plants and trees growing within
[824] [262] [278] the village have uses as food, medicine, or decoration.

A.[What Gifford actually says is "the outworks of a fortress". See 4: Gifford, this file p.136 - Anal.]

76: Yuncker N-4,5 (1953) 1959 OU9 Tonga OU9

Occasional. Rather widespread in tropical countries. Fiji, Carolines, Marianas, Australia, India, Africa, North and South America. 137

N. acuta Presl var. [?] in Hemsley's list. The collections from Tongatapu (Nelson, Home) and 'Eua (Lister) reported by Hemsley as *N. exaltata* (L.) Schott need to be reexamined; they will probably prove to be referable to either *N. biserrata* or *N. hirsutula*.

Nephrolepis hirsutula (Forster f.) Presl, Tent. Pterid., 79, 1836.

Terrestrial fern with creeping rhizome. Stipes clustered, brown, scaly, blades oblong in outline, up to 50 cm. or more long, pinnate, rachis densely brown-scaly, pinnae oblong-lanceolate, sessile, up to 10 cm. or more long and 1 cm. wide, serrulate, obtuse or acutish, pubescent, sori large, round, submarginal.

Tongatapu: in open thickets, near Vaini village, Feb. 26, 1953, *Yuncker 15044*.

'Eua: in thickets and open shade along trail above Fuai plantation near center of island, Mar. 21, 1953, *Yuncker 15406;* on dry soil on gully slopes, in open grassy central plain on way to eastern ridge, Mar. 25, 1953, *Yuncker 15439*.

Lifuka: in clearing near coastal road between Pangai and southern end of island, Apr. 28, 1953, *Yuncker 15785*.

Vava'u: in coconut plantation near village of Houma, May 22, 1953, *Yuncker 16121*.

Tafahi: roadside above township of Tafahi, on volcanic soil in forest, alt. about 70 m., Dec. 15, 1951, *Hürlimann 521*.

A common weedy species in waste areas and plantations throughout Tonga. Widely distributed in tropical areas of the Eastern Hemisphere.

Tongan name: *laufale*.

Various parts of plant are used in preparing medicines. [278]

Nephrolepis sp.

Closely resembles *N. hirsutula* but differs in some characters.

Kao: on rocky soil in rather open forested area, alt. about 570 m., May 6, 1953, *Yuncker 15901*.

Infrequent.

Genus **Humata** Cavanilles

Humata heterophylla (J. E. Smith) Desvaux, Prodr., 323, 1827.

Small epiphytic fern with brown-scaly, creeping rhizome. Stipes about 3-4 cm. long, glabrous, ridged by decurrent blade margins, blade lanceolate, up to 10 cm. or more long and 2.5 cm. wide, acuminate, base acute, decurrent, nerves pinnate, fertile fronds smaller, pinnatifid, sori dorsal, at ends of nervules.

'Eua: climbing on tree trunks in deep forest above Fuai, near center of island, Mar. 21, 1953, *Yuncker 15396;* on eastern ridge above Fuai, on large forest tree, alt. about 150 m., Nov. 9, 1951, *Hürlimann 218*.

76: Yuncker N-4,5 (1953) 1959 OU9 Tonga OU9

It is probable that some of the above varieties are incorrectly placed as to subspecies, as it was not possible to determine their exact relationship. So far as I know, no wild species of *Musa* occur in Tonga. Plantains and bananas are grown extensively throughout the group and are an important item in the diet of the Tongans. A comparatively large number of bunches are shipped annually to the New Zealand markets.

Family Zingiberaceae

Genus **Zingiber** Adanson

Zingiber zerumbet (Linnaeus) J. E. Smith, Exot. Bot. 2: 103, pl. 112, 1804.

Herbaceous plant with pubescent, leafy branches rising to about 1 m. tall from a thickened, fleshy rhizome. Leaves alternate, distichous, entire, oblong-elliptic or lanceolate, acuminate, clasping the stem at the base, up to about 30 cm. long and 5 cm. wide, pubescent beneath. Flowers white or pale yellow, in a large, bracteate, cone-like spike at top of a leafless scape up to about 30 cm. tall, bracts rounded, overlapping, becoming red.

Tongatapu: in a low wet area near Nualei, Mar. 9, 1953, *Yuncker 15221.*

'Eua: in thicket at margin of forest near summit of central part of eastern ridge. Mar. 24, 1953, *Yuncker 15455.*

Vava'u: *Crosby.*

Tafahi: at summit of Piu 'o Tafahi, Dec. 11, 1951, *Hürlimann 459.*

Niuatoputapu: on southward slope of mountain ridge opposite Vaipoa, Dec. 25, 1951, *Hürlimann 636.*

Frequent in thickets throughout the group. An Asiatic species now widely distributed in warm countries.

Tongan name: *angoango.*

The rhizome is used in preparing medicines.

Genus **Hedychium** Koenig

Hedychium coronarium Koenig, Retz. Observ. Bot. 3: 73, 1783.

Erect herb, stems up to 1 m. tall from a stout rootstock. Leaves distichous, oblong-lanceolate to lanceolate, acuminate, up to 50 cm. more long and 10 cm. wide, petiole short clasping stem with an elongated sheathlike portion. Flowers very fragrant, white turning yellow, perianth tube slender, up to 6 or 8 cm. long, in dense, terminal, bracteate spikes, bracts oblong to obovate or lanceolate, imbricate.

Tongatapu: in moist area along trail below Fatai village, Mar. 10, 1953, *Yuncker 15263.*

'Eua: in Pangai village, Mar. 25, 1953, *Yuncker 15488.*

Common in villages as an ornamental and occasionally as an escape. An Indian species now widely distributed in warm countries as an ornamental.

Tongan name: *tevunga.*

The aromatic parts of this plant are used to scent oil.

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Genus **Curcuma** Linnaeus

137 **Curcuma longa** Linnaeus, Sp. Pl., 2, 1753.

Erect, leafy, herbaceous plant with aromatic, fleshy rootstock. Leaves elliptic-oblong, distichous, acuminate, finely pinnately nerved, petiole about as long as blade, sheathing at base. Flowers several, yellowish, in axils of greenish bracts forming a dense, cone-like or cylindric head at end of leafless peduncle.

Tongatapu: in swampy area below Nualei village, Mar. 9, 1953, *Yuncker 15248.*

'Eua: in deep forest on ridge above sea-facing terraces above Lokupo, Mar. 27, 1953. *Yuncker 15537.*

Vava'u: *Crosby.*

Occasional throughout Tonga. An Indian species now widely disseminated in warm countries.

Tongan name: *ango.*

[386] [252] [278] [824] The rootstock provides a yellow dye and the leaves are used to wrap fish and in the preparation of medicines.

FAMILY CANNACEAE

Genus **Canna** Linnaeus

Canna indica Linnaeus, Sp. Pl., 1, 1753.

Smooth, erect, rhizomatous herb, up to about 1.5 m. tall. Leaves oblong-ovate or lanceolate, entire, acute to acuminate, with long, basal, petiolar part sheathing stem, blade up to 50 cm. or more long and 20-25 cm. wide, pinnately nerved, lateral nerves slender and numerous. Flowers irregular, medium to large, showy, red or yellow, in terminal racemose or paniculate clusters; fruit a warty, bristly capsule, seeds globose, hard, black.

Tongatapu: forming large patches in low moist areas near Vaini, Feb. 26, 1953, *Yuncker 15060.*

'Eua: in low moist area between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15472.*

Vava'u: *Crosby;* in waste areas near northwestern coastal cliff, May 25, 1953, *Yuncker 16159.*

[247] [824] Common in low moist areas throughout Tonga. A tropical American plant now of pantropic distribution. A number of horticultural forms are grown for ornament.

Tongan name: *misimisi.*

FAMILY MARANTACEAE

Genus **Maranta** Linnaeus

Maranta arundinacea Linnaeus, Sp. Pl., 2, 1753.

Erect, slender, glabrous, somewhat dichotomously branched herb, up to about 1 m. tall, rootstock fleshy. Leaves rather thin, ovate-oblong, acuminate, base rounded, blade

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Vava'u: *Crosby;* near upper rim of steep seaside cliff above Leimatua, May 30, 1953, *Yuncker 16060.* 137

Niuafo'ou: near upper edge of recent lava flow on way to upper rim of main crater, May 16, 1953, *Yuncker 15993;* on shore of great lake in sector of Futu. Jan. 7, 1952, *Hürlimann 667.*

Niuatoputapu: on mountain ridge above Vaipoa. Dec. 5, 1951, *Hürlimann 355.*

Occasional throughout the group but abundant on Niuafo'ou. From Indo-Malaysia to Polynesia and now in cultivation in most tropical countries.

Tongan name: *toa.*

The bark is used in medicines and the hard, durable wood is a favorite in the construction of houses, the manufacture of tool handles, and so forth. 278 342 412 814

FAMILY PIPERACEAE

Genus **Piper** Linnaeus

Piper latifolium Linnaeus f., Suppl. Pl. Emendanda, 468, 1781.

Shrub, up to 3 m. or more tall. Leaves suborbicular, shortly acute, base rounded-truncate or cordate, up to about 10 cm. wide or sometimes much larger, glabrous, palmately 11-12-nerved, petiole up to 6 cm. in length, vaginate-winged to near blade. Spikes multiple, axillary, up to 10 cm. or more long and 4-6 mm. in diameter, floral bracts round-peltate, flowers dioecious.

Tongatapu: *Forster; Moseley.*

I found no specimens of this species, and I suspect that the ones collected by Forster and by Moseley, as reported by Hemsley, are *P. puberulum* (Bentham) Bentham. Not having these specimens available at the present time, it is not possible to determine their identity. *P. latifolium* is said to occur from the Society Islands westward to the New Hebrides, although it appears to be absent from Samoa and Fiji.

Piper methysticum Forster f., De Plant. Esculent., 76, 1786.

Shrub with thick, woody rhizome, up to 3 m. or more tall, glabrous, nodes swollen. Leaves round-ovate, short-acuminate, base deeply cordate, up to 20 cm. or more long and 15-20 cm. wide, palmately 9-13-nerved, nerves minutely puberulent beneath, petiole up to 3 cm. long, vaginate at base. Spikes leaf-opposed, solitary, up to 5 or 6 cm. long, greenish white.

Tongatapu: *Home.*

'Eua: *Lister;* cultivated at Fuai plantation near center of island, Mar. 28, 1953, *Yuncker 15541.*

Vava'u: *Crosby;* along trail on way to summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16149.*

Of ancient introduction. Aside from one or two plantings of less than an acre each, all of the plants noted were occasional specimens about villages or borders of plantations, and the like.

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137 Tongan name: *kava.*

[27] The roots are pulverized and used in the preparation of the beverage known as kava.
[824]

Piper puberulum (Bentham) Bentham, in Seemann, Fl. Vit., 262, as synonym, and pl. 75, 1868.

Shrub 1-3 m. tall, stems nodose. Leaves alternate, elliptic to rounded-ovate, acuminate, base from acute to shallowly cordate, very variable in size, up to 15 cm. long and as wide, palmately 7-9-nerved, main nerves branching upward, the petiole 3 cm. or less long, vaginate-winged to middle or above. Spikes solitary, axillary, up to 15 cm. or more long; fruit fleshy and red when mature. (The following two varieties occur in Tonga.)

Piper puberulum var. **puberulum.**

Lower surface of leaf blades puberulent.

Kao: on rocky slope in thin forest, May 6, 1953, *Yuncker 15871.*

Seemingly rare in Tonga although rather frequent in Fiji.

Piper puberulum var. **glabrum** (C. de Candolle) A. C. Smith, Jour. Arnold Arboretum **24**: 356, 1943.

Leaf blades glabrous on both sides.

Tongatapu: common in thickets about Vaini village, Feb. 26, 1953, *Yuncker 15063;* in thicket near coast below village of Navutoka, Feb. 27, 1953, *Yuncker 15096.*

'Eua: in thicket above Fuai plantation, Mar. 20, 1953, *Yuncker 15370;* on limestone margin of sinkhole in forest near center of island, Mar. 18, 1953, *Yuncker 15323.*

Vava'u: margin of open forest above Leimatua village, May 18, 1953, *Yuncker 16024;* in thicket near upper rim of seaside limestone cliff along northwestern side of island, May 25, 1953, *Yuncker 16163.*

This variety is very common throughout Tonga, often forming extensive colonies in open forests or in partial shade. It is presumed that the specimens collected on Tongatapu by Home and on 'Eua by Lister (as reported by Hemsley) and by Crosby on Vava'u (as reported by Burkill) are this variety. Also in Fiji and Samoa. For an extensive discussion of this and other Pacific species of *Piper* see A. C. Smith (Jour. Arnold Arboretum **24**: 347-361, 1943).

P. macgillivrayi C.DC. in Hemsley's and Burkill's lists.

Tongan name: *kavakava'uli.*

[278] The leaves are used in preparing medicines.
[824]

Genus **Peperomia** Ruiz and Pavon

Peperomia leptostachya Hooker and Arnott, Bot. Beechey Voy., 96, 1832

Decumbent-ascending, pubescent, succulent herb. Leaves opposite or more commonly in whorls of three, oval to obovate, usually acute at both ends, up to 5 or 6 cm. long and 2-3 cm. wide, palmately five-nerved, petiole up to 1 cm. long. Spikes slender, axillary and terminal, up to 10 cm. or more long; fruit scarcely 1 mm. long, globose-subobovoid, viscid.

1 /Piper methysticum -- Analyst/
A

76: Yuncker N-4,5 (1953) 1959 009 Tonga 009

137 our plant represent *C. paniculata* (Endlicher) Planchon, originally from Norfolk Island but often accredited with a wide distribution in the Pacific. The Niue plant which I listed (B. P. Bishop Mus., Bull. 178: 45, 1943) as *C. paniculata* seems closer to the Fijian *C. harperi* Horne. This is perhaps also the closest relative to the Tongan plant, represented further by a U.S. Exploring Expedition specimen (US 206851) from Tongatapu, but the identity of my material must await a study of the genus throughout the Pacific. (See A. C. Smith, Torrey Bot. Club, Bull. 70: 535-537, 1943, for notes on the two species from Fiji.)

Genus **Trema** Loureiro

Trema amboinensis (Willdenow) Blume, Mus. Bot. Lugd.-Bat. 2: 61, 1856.

Tree, up to 7-8 m. tall. Leaves two-ranked, alternate, oblong-ovate to lanceolate, acuminate, base cordate, up to 15 cm. long and 5 cm. wide, scabrid above, soft pubescent beneath, finely serrate, palmately three-nerved, midrib strongly branching upward, petiole about 1 cm. long. Flowers very small, numerous, in dense, pubescent, axillary, cymose clusters.

Tongatapu: *Graeffe;* in old clearing between Fatai village and the sea, Mar. 10, 1953, *Yuncker 15252.*

Vava'u: *Crosby.*

Occasional. Southeastern China to Australia and eastward to Polynesia.

Given as *Sponia ambryncnsis* [*amboinensis*] Decne. in Burkill's list.

[278 824] Tongan name: *mangele.* The leaves are used in preparing medicines.

Trema orientalis (Linnaeus) Blume var. **viridis** Lauterbach, Engler Bot. Jahrb. 50: 321, fig. 2, D, 1913.

Small to medium-sized tree, or sometimes a shrub, with reddish bark and finely pubescent branches. Leaves alternate, ovate-lanceolate, acuminate, base shallowly and somewhat obliquely cordate, scabrous, crenately toothed, up to 9 cm. or more long and 4-5 cm. wide, palmately three-nerved, midrib branched upward, petiole about 1 cm. long. Flowers small, greenish, in small, axillary cymes.

'Eua: in forested area near sea, vicinity of Ha'aluma, Apr. 1, 1953, *Yuncker 15604.*

Nomuka: in thicket along road encircling island, Apr. 30, 1953, *Yuncker 15837.*

Lifuka: in clearing near eastern end of island, Apr. 27, 1953, *Yuncker 15762.*

Kao: in thicket near lower margin of slope forest, *Yuncker 15938.*

Niuatoputapu: northern slope of mountain range above Vaipoa, Dec. 27, 1951, *Hürlimann 637.*

Frequent in thickets throughout Tonga. Other Pacific islands.

Tongan name: *mangele.*

[278 824] The leaves are used in medicines.

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137 Vava'u: *Crosby.*

Niuatoputapu: in yard in Hihifo, Dec. 6, 1951, *Hürlimann 372.*

Frequent throughout Tonga. Samoa to the New Hebrides.

Tongan name: *'ovava.*

[278] [824] The leaves are used in preparing medicines.

Ficus prolixa Forster f., Fl. Ins. Australia, Prodr., 77, 1786.

Medium to large, round-topped tree. Leaves alternate, elliptic-oblong or oblanceolate, acute at both ends, up to 15 cm. or more long and 6 cm. wide but mostly somewhat smaller, entire, glabrous, pinnately nerved, midrib prominent, lateral nerves slender, petioles up to 2 cm. long. Fruit globose, 5 mm. in diameter.

Tongatapu: *Forster.*

Vava'u: *Crosby.*

Possibly widespread in the Pacific but reported from Tonga only on the basis of the Forster and Crosby collections.

Ficus pumila Linnaeus, Sp. Pl., 1060, 1753.

Small, hairy, woody vine, adhering to walls and so forth, with roothike tendrils. Leaves ovate-cordate, acute, scarcely 5 cm. long, reticulate-veiny, puberulent, sessile or subsessile. Flowers and fruit rare.

Tongatapu: covering walls of water tank near house in Nualei village, Mar. 9, 1953, *Yuncker 16255.*

Infrequent. An Indo-malayan plant widely distributed in warm countries as an ornamental vine.

Ficus scabra Forster f., Fl. Ins. Australia, Prodr., 76, 1786.

Rather small tree with puberulent twigs. Leaves alternate, ovate, acute, base rounded-cordate, oblique, up to 15 cm. or more long and 12 cm. wide, scabrous, pinnately nerved, nerves puberulent, petioles about 1 cm. long. Fruit globose, about 1 cm. in diameter, puberulent; peduncle short.

Tongatapu: *Home;* in forest near lagoon, near Vaini village, Feb. 26, 1953, *Yuncker 15049;* near Fangaveha, clinging to face of perpendicular seaside limestone cliff, some branches pendent, June 7, 1953, *Yuncker 16249.*

'Eua: in open forest above Fuai plantation near center of island, Mar. 20, 1953, *Yuncker 15387.*

Kao: in thin soil, in rocky alpine area near summit, alt. about 860 m., May 6, 1953, *Yuncker 15920.*

Niuatoputapu: on northwest slope of the mountain ridge above Hihifo, Dec. 5, 1951, *Hürlimann 338.*

Found throughout Tonga. Also in Samoa and perhaps elsewhere but frequently too widely interpreted.

This species resembles *F. storckii* closely; but according to E. J. H. Corner, who has studied the types, they differ in the fact that *F. storckii* has cystoliths on both sides of the lamina, whereas *F. scabra* has them on only the underside.

Tongan name: *masi'ata.*

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eastern ridge, Mar. 20, 1953, *Yuncker 15559;* on limestone cliff facing sea, near summit of eastern ridge, about middle of island, Apr. 8, 1953, *Yuncker 15687.*

Local in distribution in Tonga. Society Islands, Samoa, Niue, Melanesia and westward to Java or beyond.

Elatostemma sesquifolium Hassk. of Hemsley's list, based on a specimen collected on 'Eua by Lister, is presumably referable to this variety. Schröter (Fedde Repert. Sp. Nov. 45 : 265, 1938) so cites a Lister collection from 'Eua.

Genus Pipturus Weddell

Identifications of *Pipturus* are by Carl Skottsberg.

Pipturus argenteus (Forster f.) Weddell var. lanosus Skottsberg, Acta Horti Gothob. **7** : 62, 1932.

Small tree, up to 8 m. or more tall, young growth rather densely white-pubescent. Leaves alternate, oval-ovate, acuminate, base obtuse or abruptly acute, up to 15 cm. long and 8 cm wide, serrate, three-nerved from base, midrib branched upward, green above, white-woolly beneath, petiole slender, up to 8 cm. long. Flowers greenish white, in few-flowered, headlike clusters scattered along slender, axillary peduncles; fruit fleshy.

Tongatapu: *Forster;* in clearing along trail below Nualei, Mar. 9, 1953, *Yuncker 15225.*

'Eua: border of cliff on windswept limestone rocks near center of eastern ridge, Nov. 9, 1951, *Hürlimann 211;* in deep ravine short distance northeast of Ohonua village, Apr. 2, 1953, *Yuncker 15614;* on seaward face of limestone cliff on eastern ridge, Apr. 8, 1953, *Yuncker 15682.*

Kao: on rocky slope in open forest, May 6, 1953, *Yuncker 15879.*

Vava'u: *Lister;* near upper rim of limestone coastal cliff along northwestern side of island, May 25, 1953, *Yuncker 16162.*

Niuafo'ou: in crevice of 1946 lava flow along way to summit of main central crater, May 16, 1953, *Yuncker 15998.*

Tafahi: on rocky, volcanic soil, beside path from township of Tafahi to the Piu 'o Tafahi, Dec. 10, 1951, *Hürlimann 403;* on steep slope above northeast coast near northern end of island, Dec. 17, 1951, *Hürlimann 599;* on rocky volcanic soil, steep slope beneath township of Tafahi, Dec. 13, 1951, *Hürlimann 481.*

Niuatoputapu: bush forest on volcanic rock soil, on mountain range, eastward of Vaipoa, Dec. 5, 1951, *Hürlimann 364.*

Frequent on cliffs and rocky areas throughout Tonga. Also in Samoa and Rotuma.

Presumably, this is the *P. argenteus* Wedd. of Hemsley's and Burkill's lists.

Tongan names: *olonga, tou.*

A cordage fiber is obtained from the bark, and the bark and leaves are used in the preparation of medicines.

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137 Occasional in forests throughout Tonga. Also in Fiji, Samoa, and Society Islands.

Tongan names: *kainikaʻea, topuʻuno.*

278 824 The leaves are used in medicines.

FAMILY ARISTOLOCHIACEAE

Genus **Aristolochia** Linnaeus

Aristolochia elegans Masters, Gard. Chron. 2: 301, 1885.

Slender, glabrous, high-climbing, twining vine. Leaves alternate, broadly triangular reniform, obtuse, base broadly cordate, entire, petioles long and slender. Flowers solitary, axillary, on peduncles mostly 4-6 cm. long, tubular, tube curved with widely flaring limb up to 8 cm. wide, maroon with greenish-white markings. Fruit an oblong, angular, deeply grooved capsule, 4-6 cm. long, opening parachute-like when ripe.

ʻEua: climbing in trees and shrubs in deep ravine near village of Ohonua, Apr. 2, 1953, *Yuncker 15616.*

Apparently of recent introduction in Tonga. A South American species widely grown as an ornamental.

Tongan name: *fue paipa holani.*

FAMILY POLYGONACEAE

Genus **Polygonum** Linnaeus

Polygonum glabrum Willdenow, Sp. Pl. 2: 447, 1799.

Glabrous herb up to 50 cm. or more tall. Leaves alternate, elliptic-lanceolate, acuminate, base cuneate, entire, up to 15 cm. or more long and 4 cm. wide, pinnately nerved, petiole about 2 cm. long, stipules forming a loose, brown, membranous sheath (ocrae) 1-2 cm. long. Flowers small, white, in compound spikelike clusters.

ʻEua: *Lister.*

Nomuka: [collector?].

Vavaʻu: *Crosby;* along southern margin of Ngofe swamp on southwestern side of island, May 19, 1953, *Yuncker 16031.*

Infrequent in Tonga. A widespread tropical and subtropical species of both hemispheres.

Genus **Antigonon** Endlicher

Antigonon leptopus Hooker and Arnott, Bot. Beechey Voy., 308, 1841.

Attractive vine introduced and planted about dwellings, along walls, and so forth as an ornamental. Leaves alternate, wrinkled, cordate, entire, up to 10 cm. or more long, apiculate, petioles up to 2.5 cm. or more long. Flowers rose pink, in long, slender, loose racemes which end in branched tendrils.

Occasional in villages or along roadsides. A native of Mexico now cultivated in warm climates throughout the world.

1 /Amylotheca insularum -- Analyst/

76: Yuncker N-4,5 (1953) 1959 009 Tonga 009

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FAMILY MENISPERMACEAE

Genus **Stephania** Loureiro

Stephania forsteri (de Candolle) A. Gray, U.S. Expl. Exped., Bot. 1: 36, 1854.

Soft-wooded, twining, glabrous vine. Leaves alternate, round-ovate, bluntly pointed, the base rounded to retuse, peltate, up to 12 cm. or more long and 10 cm. wide, the petiole slender, nearly as long as the blade, attached 2-3 cm. from the margin of the blade. Flowers greenish, dioecious, in compound umbellate clusters; the fruit about 6 mm. in diameter, flattened and slightly laterally concave, red.

Tongatapu: *U.S. Expl. Exped.*

'Eua: in thicket near the center of the island, Mar. 28, 1953, *Yuncker 15514.*

Nomuka: in thicket along the road encircling the island between the sea and the central lake, Apr. 30, 1953, *Yuncker 15823.*

Vava'u: *Harvey; Crosby;* in thicket along the road near Houma village, May 22, 1953, *Yuncker 16115.*

Frequent in thickets throughout Tonga. Malaya to Polynesia.

S. hernandiaefolia Walp. in Hemsley's and Burkill's lists.

FAMILY ANNONACEAE

Genus **Cananga** Hooker f. and Thomson

Cananga odorata (Lamarck) Hooker f. and Thomson, Fl. India 1: 130, 1855.

Tree, up to 15 m. or more tall. Leaves alternate, elliptic-oblong, acute, base rounded, obtuse, entire, up to 20 cm. or more long and 7 cm. wide, pubescent, pinnately nerved, petiole mostly less than 2 cm. long. Flowers greenish yellow, drooping, pubescent, very fragrant, the petals linear-lanceolate, up to 8 cm. or more long, on long, puberulent pedicels, in axillary, pedunculate, umbellate clusters; fruit oblong, fleshy, black, seeds numerous.

Tongatapu: *Graeffe; Moseley;* in Navutoka village, Feb. 27, 1953, *Yuncker 15086;* in Ma'ofanga village, Nov. 23, 1951, *Hürlimann 312.*

'Eua: in Pangai village, Apr. 7, 1953, *Yuncker 15658.*

Vava'u: *Crosby.*

Introduced and cultivated in villages throughout Tonga. A southern Asiatic plant now widely cultivated in tropical countries.

Tongan name: *mohokoi.*

The wood is used for canoe outriggers; the leaves and bark in medicines; and the flowers for ornaments, in leis, and for scenting oil.

396
278
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824

Genus **Polyalthia** Blume

Polyalthia amicorum A. C. Smith, sp. nov. (fig. 9).

Arbor ad 5 m. alta trunco circiter 45 cm. diametro partibus novellis pilis fuscis 0.1-0.3 mm. longis exceptis glabra; ramulis gracilibus apices versus haud 1 mm. diametro teretibus

[TEXT CONTINUED ON PAGE 114]

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137 Tongatapu: along road about 2 km. west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15008.*

'Eua: *Lister;* on herbs and shrubs along strand, Lokupo, Mar. 27, 1953, *Yuncker 15523.*

Lifuka: in thicket near sea north of Pangai village, Apr. 25, 1953, *Yuncker 15733.*

Vava'u: *Crosby.*

Niuatoputapu: toward seacoast south of Falehau, Dec. 7, 1951, *Hurlimann 390.*

Frequent throughout Tonga. Pantropic.

Tongan name: *futai.*

FAMILY HERNANDIACEAE

Genus **Gyrocarpus** Jacquin

Gyrocarpus americanus Jacquin, Stirp. Am., 282, pl. 178, 1763.

Medium to large tree, up to 12 m. or more tall, branches rather thick. Leaves alternate, ovate, acuminate, base rounded, abruptly acute at long petiole, up to 20 cm. or more wide, entire or occasionally lobed, palmately three-nerved. Flowers small, green, unisexual, in rather broad, terminal, cymose clusters; fruit nutlike.

Tongatapu: margin of cemetery, Nuku'alofa, *Setchell and Parks 15294.*

'Eua: in village of Ohonua, Apr. 2, 1953, *Yuncker 15633;* near dwelling in Pangai village, Apr. 28, 1953, *Yuncker 15793.*

Occasional. A species of pantropic distribution.

Tongan name: *pukovili.*

278 824 The leaves and bark are used in preparing medicines.

Genus **Hernandia** Plumier

Hernandia moerenhoutiana Guillemin, Sci. Nat. Bot., Ann. II, 7: 187, 1837.

Large tree, up to 10 or 12 m. tall. Leaves alternate, oval-oblong or somewhat obovate, obtuse or somewhat pointed, base acute, entire, up to 10 cm. or more long and 8 cm. wide, palmately three-nerved, midrib strongly branched upward, petiole up to 6 cm. or more long. Flowers cream-colored, in loose, many-flowered, long-stalked, axillary clusters near ends of branches; fruit enclosed in a white or reddish, fleshy, balloonlike vesicle.

Tongatapu: *Moseley;* edge of Niutoua village, Mar. 2, 1953, *Yuncker 15109.*

'Eua: *Lister;* in Ohonua village, Apr. 2, 1953, *Yuncker 15630.*

Nomuka: on knoll near beach short distance above village, Apr. 30, 1953, *Yuncker 15812.*

Vava'u: *Crosby;* in clearing on slope leading to lagoon at Vaihoi, May 26, 1953, *Yuncker 16198.*

Occurs throughout Tonga. Society Islands to Fiji.

Tongan name: *pipitui.*

76: Yuncker N-4,5 (1953) 1959 OU9 Tonga OU9

about 7 mm. long, short-pedicellate, in few-flowered, short, axillary, racemose clusters; pods 2 cm. or more long, thin, red brown. 137

Tongatapu: edge of mangrove swamp, Nuku'alofa, *Setchell and Parks 15326.*

Nomuka: in thicket along road encircling island, Apr. 30, 1953, *Yuncker 15839.*

Vava'u: *Crosby.*

Occasional in strand thickets. India, southern China, New Guinea, Australia, Mariana and Caroline Islands, Philippines, Fiji, and other islands.

Probably the *D. monosperma* Dalz. of Burkill's list.

Tongan name: *moho.*

The seeds, which are said to be poisonous, are used as beads. [301] [824] [278]

Genus Derris Loureiro

Derris trifoliata Loureiro, Fl. Cochinchinensis, 433, 1790.

Glabrous, scandent shrub, with rather large, scattered lenticels, climbing to 5 m. or more high. Leaves alternate, odd-pinnate, leaflets three to seven, elliptic or oblong-subovate, acuminate, base obtuse, variable in size, up to 10 cm. or more long and 4 cm. wide, somewhat glossy, petiolules 5-8 mm. long. Flowers white to rose, up to 1 cm. long on short, slender pedicels in axillary, racemose, or paniculate clusters; pods one- to two-seeded, conspicuously veiny, subrhomboid to broadly oblong, up to 5 cm. long and 3 cm. wide.

Tongatapu: *U.S. Expl. Exped.;* toward beach near Fatai, Oct. 30, 1951, *Hürlimann 51;* in thicket near the beach, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15015.*

Vava'u: *Crosby.*

Occasional near the beach. Tropical Africa, Asia, Malaya, Australia, and Polynesia.

D. uliginosa Benth. in Hemsley's and Burkill's lists.

Tongan name: *kavahaha.*

The stem fibers are strong and are used for cordage. An extract of the roots is used as fish poison. [283] [226] [824]

Genus Inocarpus Forster

Inocarpus edulis J. R. and G. Forster, Char. Gen. Pl., 66, 1776.

Rather large tree, up to 12 m. or more tall. Leaves alternate, oblong to elliptic-lanceolate, entire, obtuse or bluntly pointed, base cordate, coriaceous, pinnately nerved, strongly venulose, coriaceous, up to 30 cm. or more long and 10 cm. wide, petioles stout, scarcely 1 cm. long. Flowers yellowish white, 1 cm. or more long, sessile, in spicate, pubescent clusters; fruit fleshy, rounded, 6 cm. or more long, edible.

Tongatapu: *Graeffe; Moseley;* in plantation near Nualei, Nov. 1, 1951, *Hürlimann 118;* in forested area near Lavengatonga village, Mar. 6, 1953, *Yuncker 15180.*

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Niuatoputapu: on edge of mountain ridge above Vaipoa, Dec. 5, 1951, 137 *Hürlimann 354.*

Frequent in thickets throughout Tonga. Southeastern Asia and Malaya to Polynesia. Now widely grown as an ornamental and as a forage crop.

Tongan names: *aka, akataha, fue'aepuaka.*

[231] [278] [261] [824] This plant[1] is said to be especially relished by swine. Parts of it are used in medicines, and the roots may be eaten in times of food scarcity.

Genus Canavalia de Candolle

Canavalia ensiformis (Linnaeus) de Candolle, in DC. Prodr. 2: 404, 1825.

Subglabrous, subwoody vine. Leaves alternate, trifoliate, leaflets ovate or oblong-ovate, acuminate, base rounded, obtuse, up to 15 cm. long and 6 cm. wide. Flowers pink, subsessile, reflexed, in long, axillary, spikelike racemose clusters; pod about 15 cm. long and 2 cm. wide, flat.

Vava'u: *Crosby.*

A tropical American species now widespread in warm countries.

Canavalia maritima (Aublet) Thouars, in Jour. Bot. Desv. 1: 80, 1813.

Rather coarse, herbaceous vine. Leaves alternate, trifoliate, leaflets rather thick, suborbicular, subovate or subobovate, obtuse, base rounded, obtuse to acute, up to 12 cm. or more long and nearly as wide, pubescent, hairs appressed. Flowers about 2 cm. long, short-pedicellate, in long-pedunculate axillary racemes, corolla pink; pods up to 10 cm. long, broadly linear, seeds brown.

'Eua: *Lister.*

Lifuka: in thicket along road to north of Pangai village, Apr. 25, 1953, *Yuncker 15714.*

Kao: in thicket, border of old plantation, May 6, 1953, *Yuncker 15958.*

Occasional throughout Tonga. A tropical American species now widely disseminated in tropical countries.

Probably the *C. obtusifolia* (Lam.) DC. of Hemsley's list.

Tongan name: *lautolu'uta.*

Canavalia microcarpa (de Candolle) Piper, Biol. Soc. Washington, Proc. 30: 177, 1917.

Rather coarse, herbaceous vine. Leaves alternate, leaflets ovate, acuminate, base rounded, obtuse, up to 15 cm. long and 8-10 cm. wide. Flowers purplish or pinkish, up to 3 or 4 cm. long, short-pedicellate, few, on rather long, axillary peduncles; pods thick, three-angled on one edge, up to 12 cm. long and about 5 cm. wide, pointed, seeds ovoid, flattened, brown.

Tongatapu: *U.S. Expl. Exped.*

Southeastern Asia and Malaya to Polynesia.

C. ensiformis (L.) DC. var. *turgida* Hemsl. in Hemsley's list [?].

1 /Pueraria lobata -- Analyst/

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137 oblong-ovate, acute at both ends, up to 6 or 7 cm. long and 3 cm. wide, pubescent. Flowers about 1.5 cm. long, short-pedicellate, in long-pedunculate, terminal and axillary racemose clusters, corolla purplish or dark red; pods appressed-pubescent, up to 10 cm. long and 4 mm. wide, the halves strongly twisted when opened, seeds numerous.

Tongatapu: weed in open areas on plantations, Nuaiei, Oct. 29, 1951, *Hürlimann 30*; in waste area near Navutoka village, Feb. 27, 1953, *Yuncker 15097*; in waste area near sea, Sopu, west of Nuku'alofa, May 30, 1953, *Yuncker 15296*.

'Eua: in old clearing near Ohonua village, Apr. 2, 1953, *Yuncker 15626*.

Frequent as a weed in waste areas throughout Tonga. A tropical American weed now pantropic in distribution.

Genus **Vigna** Savi

Vigna marina (Burmann) Merrill, Interpret. Herb. Amboin., 285, 1917.

Prostrate, subglabrous, long-trailing vine. Leaves alternate, trifoliate, leaflets round-ovate or suborbicular, apex rounded, base obtuse, up to 8 cm. long and 6 cm. wide, three nerved from base, midrib branched upward, lateral leaflets somewhat oblique. Flowers 1.5-2 cm. long, short-pedicellate, in few-flowered racemose clusters on axillary peduncles up to 15 cm. or more long, corolla yellow; pods slender, up to 5 cm. or more long.

Tongatapu: along shore below Fu'amotu, Nov. 3, 1951, *Hürlimann 132*; pioneering in sand along seaward margin of strand vegetation, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15009*.

'Eua: *Lister*; just above high-tide level, Lokupo, Mar. 27, 1953, *Yuncker 15530*.

Lifuka: outer edge of vegetation zone near upper tidal limit, north of Pangai village, Apr. 25, 1953, *Yuncker 15720*.

Tafahi: on shore below township of Tafahi, Dec. 13, 1951, *Hürlimann 498*.

Niuatoputapu: near shore in Falehau, Dec. 18, 1951, *Hürlimann 617*.

Common along the sandy beaches throughout Tonga. Pantropic.

Tongan names: *lautolu, lautolu hina, lautolu tahi*.

[278] [824] The leaves are used in medicines.

Genus **Dolichos** Linnaeus

Dolichos lablab Linnaeus, Sp. Pl., 725, 1753.

Vigorous, finely pubescent, twining vine. Leaves alternate, trifoliate, leaflets broadly triangular-ovate, lateral leaflets oblique, acuminate, base obtuse, three-nerved from base, midrib branched upward, up to 15 cm. long and nearly as wide, petioles up to 15 cm. or more long. Flowers about 1.5 cm. long, on slender pedicels up to 1 cm. long, in long, terminal and axillary, long-pedunculate, racemose clusters, corolla white; pods flattened, curved, up to about 10 cm. long.

Tongatapu: roadside near Nuaiei, Nov. 1, 1951, *Hürlimann 115*; *Moseley*.

Vava'u: *Crosby*; in roadside thicket between Mataika and Feletoa villages, May 19, 1953, *Yuncker 16019*; in thicket near margin of Ngofe swamp on southwestern side of island, May 19, 1953, *Yuncker 16025*.

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Occasional throughout Tonga. Widely disseminated in warm countries. 137

Tongan name: *pini 'ae puaka.*

The seeds are said to be poisonous unless cooked.

Peanuts (*Arachis hypogaea* L.), garden beans (*Phaseolus* spp.), peas (*Pisum sativum* L.), and soybeans [*Glycine max* (L.) Merrill] are cultivated as plantation and garden crops. [244] [824]

Family OXALIDACEAE

Genus **Oxalis** Linnaeus

Oxalis corniculata Linnaeus, Sp. Pl., 435, 1753.

Small, creeping, pubescent herb, stems ascending to 15 cm. or more. Leaves palmately compound, leaflets three, obcordate, about 1 cm. long, ciliate. Flowers yellow, in two- to six-flowered umbels, pedicels slender, 1 cm. or more long, on axillary peduncles; capsule cylindrical, up to 12 mm. or more long.

Tongatapu: *Moseley;* on rocks near sea, near Vaini, Feb. 26, 1953, *Yuncker 15052;* strand terrace near Houma, Oct. 28, 1951, *Hürlimann 15.*

'Eua: along path crossing high plateau of eastern ridge above Fuai, Nov. 9, 1951, *Hürlimann 201;* along open trail in forest near center of the island, Apr. 5, 1953, *Yuncker 15647.*

A common plantation and waste-area weed throughout Tonga. Pantropic.

Tongan name: *kihikihi.* The leaves are used in preparing medicines. [278] [824]

Genus **Averrhoa** Linnaeus

Averrhoa carambola Linnaeus, Sp. Pl., 428, 1753.

Small tree, up to about 6 m. tall. Leaves alternate, odd-pinnate, leaflets elliptic, acuminate, base acute, up to 6 cm. long and 3 cm. wide, petiolules scarcely 5 mm. long. Flowers red and white, small, in small, axillary clusters; fruit greenish yellow, waxy, up to 10 cm. or more long, strongly five-angled, fleshy, edible.

Tongatapu: in garden in Nuku'alofa, Mar. 7, 1953, *Yuncker 15220.*

Of recent introduction. A tropical American plant now widely cultivated for its fruit. [244] [824]

Family RUTACEAE

Genus **Fagara** Linnaeus

Fagara pinnata (J. R. and G. Forster) Engler, in Nat. Pflanzenfam. 3(4): 119, 1896.

Tree up to 12 m. tall. Leaves alternate, even-pinnate, leaflets two to five pairs, entire, somewhat obliquely elliptic, acuminate, base shorter on one side, acute, up to 7-8 cm. long and 3 cm. wide, pinnately nerved, midrib nearer shorter side. Flowers in axillary, branching clusters up to 15 cm. long; fruit about 1 cm. long, dehiscent, one-seeded, seed black.

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The leaves and bark[1] are used in medicines and in scenting coconut oil. For a discussion of this as well as other members of the Rutaceae in Tonga, Fiji, and Samoa, see A. C. Smith (Jour. Arnold Arboretum 32: 226-255, 1951).

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Genus **Acronychia** J. R. and G. Forster

Acronychia niueana St. John, B. P. Bishop Mus., Bull. **178**: 67, fig. 3, 1943.

Shrub or small tree, up to 5 m. tall. Leaves opposite, simple, oval, obtuse or retuse, base acute, up to 20 cm. long and 10 cm. wide, minutely glandular-dotted, fragrant, petiole up to 4 cm. long. Flowers very small, white, numerous, in compound, axillary, cymose clusters; fruit subglobose, 5-7 mm. in diameter.

Tongatapu: *Setchell and Parks 15181;* near Fangahina, *Setchell and Parks 15466;* in thicket, near Vaini village, Feb. 26, 1953, *Yuncker 15047.*

Infrequent. Also in Niue.

Tongan name: *ahivao.*

Genus **Micromelum** Blume

Micromelum minutum (Forster f.) Seemann, Viti, 434, 1862.

Small tree up to 4 or 5 m. tall, the branches puberulent. Leaves pinnate, the leaflets up to 12 or more, alternate, ovate-lanceolate, acuminate, the base oblique, up to 10 cm. or more long and 7 cm. wide but mostly smaller, the petiolules about 5 mm. long. Flowers very small, white, fragrant, puberulent, in many-flowered, terminal and axillary, paniculate clusters.

Tongatapu: *Forster; Moseley;* in thicket near Vaini village, Feb. 26, 1953, *Yuncker 15048;* forest, second strand terrace below Fu'amotu, Nov. 3, 1951, *Hürlimann 138, 141.*

'Eua: *Lister;* along road between Ohonua and Pangai, Nov. 8, 1951, *Hürlimann 146.*

Nomuka: in thicket on seaward side of road encircling island between sea and inland lake, Apr. 30, 1953, *Yuncker 15814.*

Lifuka: in seaside thicket north of Pangai village, Apr. 25, 1953, *Yuncker 15748;* in thicket at northern end of island near Lifuka end of the interisland causeway, May 11, 1953, *Yuncker 15983.*

Vava'u: *Crosby;* on forested slope leading down to Lake Anovai, May 19, 1953, *Yuncker 16044.*

Tafahi: fog forest below top of Piu 'o Tafahi, alt. 590 m., Dec. 10, 1951, *Hürlimann 435.*

Frequent throughout Tonga. From southern Asia through Malaya to Polynesia.

M. pubescens Blume var. *glabrescens* Oliv. in Hemsley's and Burkill's lists.

Tongan names: *takafalu, takafalu hina.*

[1] /Evodia hortensis -- Analyst/

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Tongan name: *mo'ota.*

137 The plant parts when crushed have a somewhat disagreeable odor said to [278] resemble that of fruit bats (flying foxes). The leaves are used medicinally and [757] an extract of the leaves is used for wetting tapas to cover the body "in cases [396] of weakness." The wood is used in making canoes and banana shooks and [415] for general building purposes.

[313] **Dysoxylum tongense** A. C. Smith, U.S. Nat. Herb., Contrib. 30: 509, 1952.

824 Large tree, up to 10 m. or more tall, branchlets stout and with large, rounded leaf scars. Leaves even-pinnate, up to 25 cm. or more long, leaflets elliptic-ovate, acute, base obliquely inequilateral, up to 15 cm. long and 8 cm. wide, glabrous, pinnately nerved, petiolules about 1 cm. long. Flowers small, sessile, in axillary, paniculate clusters up to 12-14 cm. long, parts of inflorescence puberulent, corolla greenish white.

'Eua: *Parks;* in forest above Fuai plantation, Mar. 18, 1953, *Yuncker 15316;* edge of forest near center of island, Mar. 18, 1953, *Yuncker 15336;* Mar. 19, 1953, *Yuncker 15366;* Apr. 7, 1953, *Yuncker 15662.*

So far as I know, this species is restricted to 'Eua Island above about 100 m. altitude.

Tongan name: *mo'ota kula.*

[313] The wood is used in handicraft work.

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[824]

Genus Aglaia Loureiro

Aglaia heterotricha A. C. Smith, U.S. Nat. Herb., Contrib. 30: 486, 1952.

Tree with slender branches, branchlets, petioles, and lower leaflet surface scaly-hairy. Leaves odd-pinnate, leaflets seven, elliptic, up to 25 cm. long and 10 cm. wide, obtuse, base obtuse or acute, petiolules up to 17 mm. or more long, petiole 15-20 cm. long, conspicuously swollen at base. Flowers about 2 mm. long, on slender, short pedicels, in freely branched, axillary, paniculate clusters, the stamen filaments united into a pilose tube.

'Eua: central plateau, June or July 1926, *Parks 16305,* type collection. Known only from 'Eua.

Aglaia saltatorum A. C. Smith, U.S. Nat. Herb., Contrib. 30: 483, 1952.

Shrub or tree, up to 10 m. tall, twigs and young parts pubescent, hairs brown, stellate. Leaves odd-pinnate, leaflets mostly seven, essentially opposite, elliptic or oblong-elliptic, apex acute or rounded, base inequilateral, obtuse or acute, up to 15 cm. long and 8 cm. wide, pinnately nerved. Flowers small, about 2 mm. long, numerous, in rather large, axillary, paniculate clusters; fruit subglobose or ellipsoidal, about 2 cm. long, brown, stellately pubescent.

Tongatapu: *Setchell and Parks; McKern;* in seaside forest below village of Niutoua, Mar. 2, 1953, *Yuncker 15138.*

'Eua: in rich forest above Fuai plantation, Mar. 18, 1953, *Yuncker 15313.*

Nomuka: above village in clearing near sea, Apr. 30, 1953, *Yuncker 15857.*

Lifuka: along road north of Pangai village, Apr. 25, 1953, *Yuncker 15738.*

Vava'u: *Crosby.*

Niuatoputapu: on coral soil near dwelling, Jan. 2, 1952, *Hürlimann 649.*

1 /Dysoxylum forsteri -- Analyst/
A

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Rather frequent throughout Tonga. Also in Fiji and Niue. 137

Aglaia sp. in Burkill's list.

Tongan name: *langakali*. -

The flowers are used for leis and for scenting oil.[1]

For a discussion of the Fijian, Samoan, and Tongan members of the Meliaceae, see A. C. Smith (U.S. Nat. Herb., Contrib. **30**: 469-522, 1952). [301] [303] [824] [113]

Family DICHAPETALACEAE

Genus **Dichapetalum** Thouars

Dichapetalum vitiense (Seemann) Engler, in Engler and Prantl, Nat. Pflanzenfam. **3**(4): 348, 1897.

High-climbing, woody vine, the young twigs puberulous. Leaves alternate, elliptic-subovate or subobovate, acuminate, base rounded, obtuse or acute, sometimes inequilateral, entire, up to 15 cm. or more long and 7 cm. wide, pinnately nerved, finely venulose as viewed by transmitted light. Flower buds yellow-hairy; fruit obovoid, 1-2 cm. in diameter, densely puberulent.

'Eua: canyon of Lakatoha River near Ohonua, Nov. 10, 1951, *Hürlimann 247*.

Vava'u: in forest near summit of ridge, Mo'ungalafa, May 27, 1953, *Yuncker 16203*; near Neiafu, Aug. 1926, *Setchell and Parks 15654*.

Infrequent. Also in Fiji.

Tongan name: *tuamea*.

Said to be poisonous. [278] [824]

Family EUPHORBIACEAE

Genus **Phyllanthus** Linnaeus

Phyllanthus niruri Linnaeus, Sp. Pl., 981, 1753.

Branching, slender-stemmed, glabrous plant, up to 30 cm. or more tall, subwoody at base. Leaves alternate, along very slender branches, paler beneath, oblong-subspatulate, somewhat oblique, obtuse, base subacute, up to about 1 cm. long and 3 or 4 mm. wide, subsessile on very short petioles. Flowers very small, white, pendent beneath branches on short, slender, axillary pedicels; fruit small, depressed-globose.

Tongatapu: ballast weed, *Setchell and Parks 15329*.

Lifuka: in sandy soil, clearing near beach north of Pangai village, Apr. 25, 1953, *Yuncker 15719*.

Niuatoputapu: in cultivated area above Hihifo toward mountain range, alt. 30 m., Dec. 5, 1951, *Hürlimann 329*.

Occasional. A pantropic weedy plant.

Phyllanthus simplex Retzius, Observ. Bot. **5**: 29, 1789.

Slender, glabrous, branching plant, up to 60 cm. tall, slightly woody at base. Leaves numerous, alternate, elliptic-oblong, acutish with a short, mucronate tip, up to about 2 cm.

[1] /Aglaia saltatorum -- Analyst/

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137 long and 6 mm. wide, subsessile. Flowers very small, solitary, on slender, axillary pedicels; capsule small, subglobose, three-parted.

Tongatapu: *Cook;* waste area near village of Niutoua, Mar. 2, 1953, *Yuncker 15125.*

'Eua: *Lister;* in open area near edge of forest above Fuai plantation, Mar. 19, 1953. *Yuncker 15339.*

Tafahi: along road between township of Tafahi and landing place Faihavanui, alt. 70 m., Dec. 15, 1951, *Hürlimann 527.*

Niuatoputapu: roadside between Falehau and the southeast coast, alt. 10 m., Dec. 7, 1951, *Hürlimann 397.*

Frequent throughout Tonga. Southern Asia and Malaysia to Micronesia and Polynesia.

Genus **Glochidion** Forster

Glochidion concolor Mueller-Argoviensis, Linnaea 32: 62, 1863.

Tree, up to 7-8 m. or more tall, branchlets slender, glabrous. Leaves alternate, two-ranked, elliptic, acuminate, base acute, up to 10-12 cm. long and 4-5 cm. wide, paler beneath, pinnately nerved, entire, petiole up to 5 mm. long. Flowers small, on pedicels up to 5 mm. long, in several-flowered, axillary fascicles; fruit depressed-oblate, grooved.

'Eua: margin of forest near center of island, Mar. 19, 1953, *Yuncker 15363;* in open forest north of Fuai plantation, Apr. 5, 1953, *Yuncker 15648.*

Lifuka: in thicket near sea, north of Pangai village, Apr. 25, 1953, *Yuncker 15729.*

Vava'u: side of trail on way to summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16148.*

Rather frequent throughout Tonga. Also in Fiji.

Tongan name: *malolo.*

An extract of the leaves is used in preparing medicines.

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Glochidion ramiflorum Forster f., Fl. Ins. Australia, Prodr., 361, 1786.

Medium to large tree, up to 18 m. tall, branchlets glabrous. Leaves alternate, two-ranked, elliptic, acuminate, base acute, up to 12-14 cm. long and 6 cm. wide, entire, petiole about 5 mm. long, narrowly winged by decurrent blade margins. Flowers small, on slender pedicels up to 1 cm. long, in few-flowered, axillary fascicles; fruit depressed-oblate, grooved.

Tongatapu: in swampy area near village of Navutoka, Feb. 25, 1953, *Yuncker 15071;* along trail through thicket below Nualei village, Mar. 9, 1953, *Yuncker 15233.*

'Eua: *Lister;* in moist ravine forest near center of island, Mar. 18, 1953. *Yuncker 15321.*

Nomuka: in thicket near sea along road encircling island, Apr. 30, 1953. *Yuncker 15862.*

Lifuka: in thicket near beach, along coast north of Pangai village, Apr. 25, 1953, *Yuncker 15717.*

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Vava'u: *Crosby*.

Niuafo'ou: thicket just above upper margin of recent lava flow, May 16, 1953, *Yuncker 15989*.

Frequent throughout Tonga. New Hebrides eastward to [?] Samoa.

Phyllanthus ramiflorus Muell. Arg. in Hemsley's list and *P. ramiflorus* var. *genuinus* Muell. Arg. in Burkill's list.

Tongan names: *malolo, misikoka*.

The leaves and bark are used in preparing medicines.[1]

For a discussion of the taxonomic status and distribution of *G. concolor* and *G. ramiflorum* see Croizat (Sargentia 1: 47, 1942).

Genus **Bischofia** Blume

Bischofia javanica Blume, Bijdr. Fl. Java, 1168, 1826.

Tree, up to 10 m. or more tall, branchlets and leaves glabrous. Leaves alternate, three-foliate, leaflets ovate-elliptic, acuminate, base acute, up to 15 cm. long and 8 cm. wide, crenate-dentate, terminal leaflet long-stalked, lateral leaflets on petiolules 1-1.5 cm. long. Flowers small, dioecious, numerous, in axillary, panicled racemose clusters; fruit globose, fleshy, up to about 1 cm. in diameter.

Tongatapu: *Moseley;* thicket near Hufangalupe, Feb. 26, 1953, *Yuncker 15042;* near dwellings, Ma'ofanga, Nov. 23, 1951, *Hürlimann 313;* near Nualei, Dec. 26, 1951, *Hürlimann 677*.

'Eua: in forested area near center of island, Mar. 18, 1953, *Yuncker 15313;* in forest along creek above Fuai, alt. 90 m., Nov. 8, 1951, *Hürlimann 164*.

Nomuka: thicket near shore of lake, along road encircling island, Apr. 30, 1953, *Yuncker 15856*.

Lifuka: in thicket between road and beach, north of Pangai village, Apr. 25, 1953, *Yuncker 15715*.

Vava'u: *Crosby;* in thicket along road between Houma village and sea, May 22, 1953, *Yuncker 16122*.

Common throughout Tonga. India, China, and Malaysia to Polynesia.

[?] Including *B. leptopoda* Muell. Arg. *sensu* Hemsley's list.

Tongan name: *koka*.

The bark furnishes a dye used in coloring tapa; the stems are used for posts and so forth.

Genus **Claoxylon** Jussieu

Claoxylon parvicoccum Croizat, Sargentia 1: 49, 1942.

Tree up to 8 m. or more tall, the branchlets and leaves glabrous. Leaves alternate, elliptic-ovate, acuminate, the base acute to long-cuneate, 12-15 cm. or more long and 5-8 cm. wide, sharply crenately toothed, pinnately nerved, the petiole up to 8 cm. or more long. Flowers unisexual, in slender, spicate clusters.

[1] /Glochidion ramiflorum -- Analyst/

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137 'Eua: *Parks 16262* [cited by Croizat]; forested area near center of island, Mar. 18, 1953, *Yuncker 15322.*

Infrequent. Also in Fiji.

Genus **Macaranga** Thouars

Macaranga harveyana (Mueller-Argoviensis) Mueller-Argoviensis, in DC. Prodr. 15(2): 998, 1866.

Small, soft-wooded, dioecious tree, up to 8 m. or more tall, branchlets stout, pithy. Leaves alternate, peltate, round-ovate, acuminate, very shallowly toothed or entire, paler and golden glandular-dotted beneath, about eight-nerved from petiole, midrib branched upward, up to 20 cm. or more long and 18 cm. wide, commonly somewhat smaller, petioles up to 15 cm. or more long, stipules lanceolate, long-acuminate, up to 2 cm. long. Flowers small, in axillary, paniculate-racemose clusters; fruit depressed-globose, soft-spiny, about 1 cm. in diameter.

Tongatapu: *Moseley;* thicket along road near Vaini village, Feb. 26, 1953, *Yuncker 15053* (male), *15065* (female).

'Eua: *Lister;* margin of old plantation between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15482.*

Lifuka: thicket near northern end of island near Lifuka end of interisland causeway. May 11, 1953, *Yuncker 15980.*

Kao: lower margin of forest near old plantation, May 6, 1953, *Yuncker 15960.*

Vava'u: *Crosby;* in clearing on slope above the lagoon at Vaihoi, May 26, 1953, *Yuncker 16200.*

Tafahi: forest along path to Piu 'o Tafahi, alt. 150 m., Dec. 10, 1951, *Hürlimann 406.*

Frequent throughout Tonga. Fiji, Niue, and Samoa to the Society Islands.

Tongan name: *loupata.*

313 342 322 415 The timber is used for house construction, handicraft work, banana shooks, and other purposes; the leaves, for covering *umu* (ovens), for wrapping fish, and in medicines used for stomach disorders in infants.

251 278 854 824 **Macaranga seemannii** (Mueller-Argoviensis) Mueller-Argoviensis, in DC. Prodr. 15(2): 999, 1866.

Tree up to 18 m. tall, branchlets and petioles subglabrous. Leaves alternate, broadly ovate, long-acuminate, base rounded, peltate 2.5-7.5 cm. from margin, six- to eight-nerved from petiole, glandular beneath, nerves beneath puberulent, up to 30 cm. long and 22 cm. wide but commonly somewhat smaller, petiole up to 18 cm. long, stipules oblong-lanceolate, up to 4 cm. long and 1 cm. wide. Flowers small, in axillary, paniculate clusters up to 12 cm. long; fruit smooth, glandular.

Tongatapu: *Cook; U.S. Expl. Exped.*

Infrequent. Also in Fiji.

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Vava'u: *Crosby;* in thicket along road near sea below the village of Houma, May 22, 1953, *Yuncker 16135.* 137

Frequent throughout Tonga. Southern Asia and Malaysia to Polynesia.

Tongan name: *tuitui.*

An extract of the bark is used for dyeing, and oil obtained from the fruit is used in a number of ways. [386] [824]

Genus **Jatropha** Linnaeus

Jatropha curcas Linnaeus, Sp. Pl., 1006, 1753.

Glabrous shrub or small tree up to 5 or 6 m. tall. Leaves alternate, round-ovate, three- or five-lobed, lobes acuminate, base cordate with broad sinus, palmately seven-nerved, midrib and lateral nerves strongly branched upward, 15 cm. or more long and as wide, petiole commonly longer than blade. Flowers greenish-white, 6-8 mm. wide, in axillary, pedunculate, cymose clusters; capsule up to 3 cm. long.

Tongatapu: in thicket near village of Niutoua, Mar. 2, 1953, *Yuncker 15116.*

'Eua: in thicket near Ohonua, Apr. 2, 1953, *Yuncker 15637.*

Lifuka: along road about midisland between Pangai village and eastern side of island, Apr. 27, 1953, *Yuncker 15774.*

Vava'u: *Crosby.*

Frequent throughout Tonga. A tropical American species now of pantropic distribution.

Tongan name: *fiki.*

Often grows in rows about plantations, along roads, and other places where it is used as living fence posts. An extract of the leaves is used in preparing medicines. [824] [245] [278]

Jatropha multifida Linnaeus, Sp. Pl., 1006, 1753.

Shrubs or small tree up to about 6 m. tall. Leaves nearly round in outline but deeply divided into seven to 11 lobes, the lobes entire or incised, glabrous. Flowers bright red, in compound, cymose clusters.,

Tongatapu: *Setchell and Parks 15518.*

Occasional in villages. A native of tropical America, now widely planted as an ornamental.

Tongan name: *fiki papalangi.*

Genus **Manihot** Tournefort

Manihot esculenta Crantz, Inst. Rei Herb. 1: 167, 1766.

Glabrous, half-woody, shrubby plant, up to about 2 m. tall. Leaves alternate, paler beneath, deeply palmately parted into three to seven lanceolate, entire, acuminate divisions, up to 20 cm. or more long and about as wide. Flowers monoecious, about 2 cm. wide, yellowish-green or reddish, in few-flowered, axillary, paniculate clusters, often not developing; fruit subglobose, about 1.5 cm. in diameter, ridged.

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137 Niuatoputapu: in forest, top of mountains above Hihifo, alt. 100 m., Dec. 5, 1951, *Hürlimann 346*.

Frequent throughout Tonga. Philippines to Polynesia.

Tongan name: *tavahi*.

[824 B13 278] The timber is used for general construction purposes, banana shooks, and so on; the leaves, in medicines.

Family CELASTRACEAE

Genus **Gymnosporia** Wight and Arnott

Gymnosporia vitiensis (A. Gray) Seemann, Fl. Vit., 40, 1865.

Scrambling, much-branched shrub or small tree up to 4 m. tall, the twigs angled. Leaves alternate, oval, obtuse or subacute, base wedge-shaped, minutely toothed, up to 8 or 9 cm. long and 5 cm. wide, pinnately nerved, petioles up to 1 cm. long. Flowers white, about 5 mm. wide, five-parted, on slender pedicels in the axils of small, fimbriate-ciliate bracts, in terminal or axillary, paniculate clusters; fruit three-celled, red, seeds red.

Tongatapu: *Nelson*.

'Eua: *Lister;* sea-facing side of limestone cliff near summit of eastern ridge, Apr. 8, 1953, *Yuncker 15675;* forest near center of island, Apr. 6, 1953, *Yuncker 15651;* seaward terrace above village of Honuma, Mar. 26, 1953, *Yuncker 15502;* little valley on eastern ridge, plateau above Fuai, Nov. 9, 1951, *Hürlimann 189*.

Nomuka: along road encircling island between sea and inland lake, Apr. 30, 1953, *Yuncker 15834*.

Vava'u: *Crosby;* seaward face of limestone coastal cliff above Leimatua, May 20, 1953, *Yuncker 16056;* upper rim of steep seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16086;* sprawling on side of rocky cliff near sea below Houma village, May 22, 1953, *Yuncker 16132*.

Common and widely distributed throughout Tonga. Fiji and eastward in Polynesia to Samoa, Society Islands, and the Marquesas.

Tongan name: *olamaka*.

[824 352] The long, pliable branches are used in making chairs.

Family ICACINACEAE

Genus **Citronella** D. Don

Citronella samoensis (A. Gray) Howard, Jour. Arnold Arboretum 21: 475. 1940.

Tree with diffuse top, up to 6 m. or more tall. Leaves leathery, glossy, oval-ovate, acuminate, base acute, entire, up to 15 cm. or more long and 8 cm. wide, pinnately nerved, lateral nerves submarginally loop-connected, petioles 1-2 cm. long, canaliculate. Flowers small, in few-flowered clusters in a terminal racemose cluster up to 15 cm. long; fruit ellipsoidal, about 2-3 cm. long, black.

1 /Rhus taitensis -- Analyst/

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Tongatapu: *Forster;* forest near village of Niutoua, Mar. 2, 1953, *Yuncker 15168.*

'Eua: open forest along trail between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15486.*

Vava'u: *Crosby.*

Niuatoputapu: near township of Vaipoa, on road to Falehau, alt. 5 m., Dec. 7, 1951, *Hürlimann 377.*

Occasional throughout Tonga. Malaya, New Guinea, and Polynesia.

Tongan name: *tava.*

Varieties are recognized under the following names: *tava kula, tava moli, tava toua.*

The timber[1] is used in house construction, for tapa pounders, for banana shooks, and so on; the fruit is sometimes eaten; and the bark is used in medicine for "stomach troubles."

Genus **Guioa** Cavanilles

Guioa lentiscifolia Cavanilles, Icones Descr. Pl. 4: 50, pl. 373, 1797.

Small tree 3-5.5 m. tall, young twigs, leaves, and so forth puberulent. Leaves alternate, pinnately compound, leaflets varying in number, apex rounded, obtuse to acute, base narrowed and decurrent on very short petiolule, up to 6 cm. long and 3 cm. wide but mostly smaller, pinnately nerved, midrib prominent, lateral nerves slender, submarginally loop-connected. Flowers small, white, in terminal and axillary, paniculate clusters; fruit strongly lobed, up to 2 cm. wide.

'Eua: seaward margin of forest on terrace above village of Houma on northwestern side of island, alt. about 160 m., Mar. 26, 1953, *Yuncker 15503;* thicket, edge of forest above Fuai plantation, near center of island, Mar. 29, 1953, *Yuncker 15545.*

Vava'u: near upper rim of seaside cliff above Ha'alaufuli on northeastern side of island, alt. about 120 m., May 21, 1953, *Yuncker 16106.*

Tongan name: *'olive.*

The cited specimens certainly appear to represent the endemic described and illustrated by Cavanilles and further briefly discussed by Radlkofer (Sitzber. Math.-Phys. Kl. Akad. Wiss. München 9: 608, 1879; Pflanzenr. 98 [IV. 165]: 1158, 1933). It may be noted that Radlkofer defines *Guioa* as having squamate petals, but Cavanilles gives no indication of this character in his description or plate, and the material now dissected (*Yuncker 15503*) shows the petals to be esquamate. As *G. lentiscifolia* is the genotype, a revision of Radlkofer's circumscription is a matter for the future monographer to consider. Actually, on the basis of other characters, the many species now referred to *Guioa* seem correctly placed, but less dependence upon petal characters may be indicated. Possibly this is the species listed by Hemsley (Linn. Soc. Bot. Jour. 30: 172, 1894) and Burkill (op. cit. 35: 33, 1901) as *Guioa glauca*

1 /Pometia pinnata -- Analyst/

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Genus **Alphitonia** Reissek

137 **Alphitonia zizyphoides** (Solander) A. Gray, U.S. Expl. Exped., Bot. 1: 278, pl. 22, 1854.

Medium to large tree with young branches brown-tomentose. Leaves alternate, elliptic-lanceolate, acute, base rounded, obtuse or acutish, up to 15 cm. or more long and 5 cm. wide, pinnately nerved, nerves prominent, bright green above, whitened-tomentose beneath, petioles 1-2 cm. long. Flowers small, whitish, numerous, in branching, axillary, and terminal, cymose clusters; fruit about 5 mm. in diameter, purplish.

Tongatapu: *U.S. Expl. Exped.; Home;* forest near sea, vicinity of Niutoua village, Mar. 2, 1953, *Yuncker 15121.*

'Eua: *Lister;* summit of eastern ridge above Fuai, Nov. 9, 1951, *Hürlimann 199;* open forest near center of island, Mar. 19, 1953, *Yuncker 15360.*

Nomuka: clearing along road encircling island between sea and central lake, Apr. 30, 1953, *Yuncker 15819.*

Lifuka: roadside, between Pangai village and southern end of island, Apr. 28, 1953, *Yuncker 15784.*

Kao: lower margin of slope forest, May 6, 1953, *Yuncker 15962.*

Vava'u: *Crosby;* upper slope of Talau, west of Neiafu, May 24, 1953, *Yuncker 16153.*

Tafahi: along road from township of Tafahi toward Taihavanui, Dec. 15, 1951, *Hürlimann 567.*

Frequent throughout Tonga. From Sumatra and the Philippines eastward to Polynesia.

A. excelsa Reiss. in Hemsley's and Burkill's lists.

Tongan name: *toi.*

[824] [313] [396] [278] [515] This tree provides an excellent grade of timber useful in construction work and for dugout canoes, poi pounders, banana shooks, and the like. The bark is used in preparing medicines, and the leaves may be used as a soap substitute.

FAMILY ELAEOCARPACEAE

Genus **Elaeocarpus** Linnaeus

Elaeocarpus tonganus Burkill, Linn. Soc. Bot., Jour. 35: 29, 1901.

Medium-sized tree up to 10 m. or more tall. Leaves alternate, elliptic or elliptic-ovate, acuminate, base acutish or obtuse, crenulate, up to 12 cm. or more long and 6 cm. wide, pinnately nerved, petiole slender, up to 4 or 5 cm. long. Flowers less than 1 cm. long, in simple, mostly axillary racemes up to 5 cm. or more long, pedicels up to 1.5 cm. long, inflorescence silky-hairy; fruit ellipsoidal, up to 1.5 cm. long.

'Eua: in forest near summit of eastern ridge, Mar. 30, 1953, *Yuncker 15554* [a juvenile specimen, presumably this species].

Vava'u: *Crosby 15* [type]; edge of forest above Leimatua, May 20, 1953, *Yuncker 16055;* on steep slope leading to lagoon at Vaihoi, below Leimatua, May 26, 1953, *Yuncker 16183.*

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irregularly toothed, up to 8 cm. or more long and as wide, stellate-pubescent, petioles up to 5 cm. or more long. Flowers on short axillary pedicels, corolla white to pink; fruit about 1 cm. wide, the five segments covered with barbed spines, burlike. 137

Tongatapu: *U.S. Expl. Exped.;* along forest trail near Niutoua village, Mar. 2, 1953, *Yuncker 15136.*

'Eua: in clearing near center of island, Mar. 24, 1953, *Yuncker 15434.*

Vava'u: *Harvey; Crosby.*

Frequent as a roadside and waste-area weed. An Indo-Malaysian species now pantropic.

Hemsley lists *U. morifolia* DC. for Tonga on the authority of de Candolle and cites no collections. This is now considered to be a synonym of *U. sinuata* Linnaeus which is now treated as a synonym of *U. lobata.*

Tongan name: *mo'osipo.*

The leaves are used in medicines. [824] [278]

Genus **Hibiscus** Linnaeus

Hibiscus abelmoschus Linnaeus, Sp. Pl., 693, 1753.

Hirsute, subwoody plant, up to about 1 m. tall. Leaves alternate, broadly ovate in outline, up to 12 cm. long and about as wide, base cordate, palmately three- to five-lobed, lobes acute to acuminate, toothed, petioles about as long as the blade. Flowers 5 cm. or more wide, solitary, on axillary pedicels up to 5 cm. or more long, corolla yellow with an orange or red center; capsule oblong, pointed, 5 cm. or more long, hirsute, splitting into five sections.

'Eua: *Lister;* scattered plants in undergrowth of old coconut plantation near Ha'aluma, Apr. 1, 1953, *Yuncker 15585.*

Vava'u: *Barclay; Crosby;* in wet, marshy edge of Ngofe swamp, on southwestern side of island. May 20, 1953, *Yuncker 16030.*

Occasional in waste areas. India to Malaya and Polynesia.

Tongan names: *loa, fau'ingo.*

The seeds furnish a dye used in decorating tapas, and various parts of the plant are used in preparing medicines. [824] [386] [278]

Hibiscus rosa-sinensis Linnaeus, Sp. Pl., 694, 1753.

Shrub up to 3 m. or more tall. Leaves simple, alternate, ovate, acute, base obtuse or subacute, up to 15 cm. or more long and 12 cm. wide, dentate, palmately five-nerved, petiole up to about 5 cm. long. Flowers up to 12 or 15 cm. wide, on slender, elongate axillary pedicels near ends of branches, various shades of red.

Cultivated about villages as an ornamental. Occasionally adventive. An Asiatic species now cultivated in warm countries throughout the world. [245] [824]

Hibiscus schizopetalus (Masters) Hooker f., Curtis's Bot. Mag. III, 36: pl. 6524, 1880.

Glabrous shrub up to about 3 m. or more tall. Leaves alternate, ovate-elliptical, acute, dentate. Flowers solitary, pendulous on long pedicels at ends of slender, drooping branches, petals much dissected, reflexed, coral red.

1 /Urena lobata -- Analyst/

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Occasional[1] in villages as an ornamental. A native of tropical Africa now widely cultivated in warm countries.

Hibiscus syriacus Linnaeus, Sp. Pl., 695, 1753.

Erect, branching, glabrous shrub 2 m. or more tall. Leaves rhombic-ovate, alternate, lower ones often three-lobed, toothed, acute to acuminate. Flowers up to 8 cm. wide, red or purplish, solitary in leaf axils on current season's growth; fruit ovoid, up to 2.5 cm. long.

Introduced ornamental. Occasional. A Chinese species now of worldwide cultivation in tropical and temperate countries.

Hibiscus tiliaceus Linnaeus, Sp. Pl., 694, 1753.

Tree up to 8 m. or more tall with glabrous or somewhat pubescent, spreading branches. Leaves round-ovate, abruptly acuminate, base deeply cordate with a narrow sinus, up to 15 cm. or more long and nearly as wide, palmately seven- to nine-nerved, glabrescent above, paler and densely stellate-pubescent beneath, petioles up to 12 or 15 cm. long. Flowers up to 10 cm. wide, on short, axillary and terminal pedicels, corolla yellow with darker eye, turning salmon red; capsule pubescent, five-celled, several-seeded, seeds glabrous.

Tongatapu: thicket near beach, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15027*.

'Eua: *Lister;* in thin forest below Fuai plantation, near center of island, Mar. 19, 1953, *Yuncker 15358*.

Lifuka: in seaside thicket just above high-tide limit, north of Pangai village, Apr. 25, 1953, *Yuncker 15742*.

Vava'u: *Harvey; Crosby*.

Tafahi: coastal forest, below township of Tafahi, Dec. 13, 1951, *Hürlimann 490*.

Frequent throughout Tonga, usually near the shore. Pantropic.

Tongan name: *fau*.

824 293 313 278 757

The bark fibers are used in making cordage, mats, *tauvale*, kava filters, and so forth. The wood is used in general construction work and fences: the bark and young leaves, in the treatment of skin diseases.

Genus **Thespesia** Solander

Thespesia populnea (Linnaeus) Solander, ex Correa, Mus. Nat. Hist. Nat. Paris, Ann. 9: 290, 1807.

Medium-sized, round-topped tree, the young branches brown-scurfy. Leaves simple, alternate, somewhat fleshy, ovate, acuminate, base cordate with an open sinus, entire or rarely somewhat lobed, palmately five- to seven-nerved, up to 12 cm. or more long and 10 cm. wide, petioles up to 10 cm. or more long. Flowers up to 8 or 10 cm. wide, solitary, on stout, axillary pedicels, corolla yellow with reddish center, changing to purple with age; capsules depressed-globose, about 2.5 cm. in diameter, seeds 10, hairy.

Tongatapu: seaside thicket near Niutoua village, Feb. 27, 1953, *Yuncker 15107*.

1 /Hibiscus schizopetalus -- Analyst/

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'Eua: *Lister;* deep ravine northeast of Ohonua village, Apr. 2, 1953, *Yuncker 15629.*

Lifuka: near sea north of Pangai village, Apr. 25, 1953, *Yuncker 15746.*

Vava'u: *Crosby.*

Tafahi: coastal forest, near Hou, alt. 5 m., Dec. 17, 1951, *Hürlimann 586.*

Frequent near the shore throughout Tonga. Pantropic.

Tongan name: *milo.*

The leaves and fruit are used in preparing medicines. The timber takes a good polish, is durable under water, and is used in construction and handicraft work.[1]

Genus **Gossypium** Linnaeus

Gossypium brasiliense Macfayden, Fl. Jamaica 1:72, 1837.

Semi-shrubby, branching plant, up to 1.5 m. or more tall. Leaves alternate, round-ovate in outline, three- to five-lobed, lobes entire, on long petioles. Involucral bracts cordate, laciniate, acuminate, seeds numerous, covered with long, white fibers.

Vava'u: *Crosby.*

Introduced and occasional in villages. Pantropic.

Tongan name: *vavae.*

Hibiscus manihot Linnaeus, called *pele* by the Tongans, is cultivated for its young growth, which is used as a green vegetable.

Family BOMBACACEAE

Genus **Ceiba** Medikus

Ceiba pentandra (Linnaeus) Gaertner, Fruct. et Semin. Pl. 2:244, pl. 133, fig. 1, 1791.

Medium to large, glabrous, soft-wooded tree with smooth or short-spiny bark and whorled, spreading branches. Leaves palmately compound, leaflets five to nine, elliptic to oblanceolate, entire, of various sizes, acuminate, petioles long. Flowers white or pinkish, petals pubescent, up to 2.5 cm. long; capsules up to 15 cm. long, seeds numerous, silky-hairy.

Introduced and now occasional in villages and along roadsides throughout the group.

The silky seed fibers are used as a filling for pillows and cushions. Probably of tropical American origin; now pantropic.

Tongan name: *vavae.*

Family STERCULIACEAE

Genus **Melochia** Linnaeus

Melochia aristata A. Gray, U.S. Expl. Exped., Bot. 1:193, 1854.

Small tree, up to 4 m. or more tall. Leaves alternate, ovate, acute, base rounded, obtuse or abruptly acute, up to 12 cm. or more long and 8 cm. wide, palmately five- to seven-nerved, midrib branched upward, crenately toothed, petiole slender, up to 8 cm. or more

[1] /Thespesia populnea -- Analyst/

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[137] [824] [342] [313] [415] [278]

Tongan names: *feta'u, tamanu.*[1]

This strong and durable wood is used in house construction and other building purposes, and sections of the trunk are used to make large kava bowls. The oil from the seeds is used medicinally.

Calophyllum vitiense Turrill, Linn. Soc. Bot., Jour. **43**: 17, 1915.

Tree, up to 10 m. or more tall, stems to 35 cm. in diameter. Leaves opposite, oblong-elliptic, obtuse or acute, base acute-decurrent, up to 13 cm. or more long and 5 cm. wide, leathery, glossy, entire, pinnately nerved, midrib prominent, lateral nerves very slender, numerous, parallel, petiole 1-2 cm. long, canaliculate. Flowers about 1.5 cm. wide, in racemose, axillary clusters, corolla pink, stamens numerous; fruit subglobose, 2 cm. or more in diameter, outer flesh pink when young.

'Eua: margin of forest near summit of eastern ridge, Mar. 24, 1953, *Yuncker 15435;* forest near center of island, Mar. 18, 1953, *Yuncker 15326.*

Kao: in forest on steep, rocky slope, May 6, 1953, *Yuncker 15883.*

Occasional. Also in Fiji and the Solomon Islands.

No differences of consequence are apparent among these specimens and the numerous Fijian collections referred to *C. vitiense,* except that the latter have white flowers. This species, not otherwise recorded from Tonga, is probably the one listed by Hemsley (Linn. Soc. Bot., Jour. **30**: 169, 1894) as *C. spectabile* and by Burkill (op. cit. **35**: 27, 1901) as *Calophyllum* sp. (A. C. Smith).

Tongan name: *tamanu.*

[824] [313]

The timber is strong and hard and is used for building purposes.

Genus Garcinia Linnaeus

Garcinia myrtifolia A. C. Smith, Jour. Arnold Arboretum **31**: 315, 1950.

Glabrous tree, up to 7 m. or more tall, the trunk up to 25 cm. in diameter. Leaves elliptic or subovate, up to 14 cm. long and 7 cm. wide, obtuse or short-acute, base rounded, abruptly acute-decurrent, subcoriaceous, pinnately nerved, midrib prominent, lateral nerves numerous, very slender, petiole stout, canaliculate, about 1 cm. long. Flowers mostly solitary, on axillary pedicels about 1 cm. long; fruit ellipsoidal, about 2 cm. in diameter, with an apical crownlike thickening.

'Eua: edge of forest near center of island, Mar. 20, 1953, *Yuncker 15381.*

Kao: in forest on steep, rocky slope, May 6, 1953, *Yuncker 15908, 15955.*

Occasional.

These interesting specimens are clearly referable to the supposed Fijian endemic, of which at least three other Fijian collections have been noted since its description (A. C. Smith).

Tongan name: *feto'omaka.*

[824] [303]

The bark is used for scenting oil.

Garcinia pseudoguttifera Seemann, Fl. Vit., 40, 1865.

Tree, up to 6 m. or more tall. Leaves opposite, obovate, apex rounded, emarginate, base acute-decurrent, up to 7 cm. or more long and 5 cm. wide, coriaceous, pinnately

1 /Calophyllum inophyllum -- Analyst/

76: Yuncker N-4,5 (1953) 1959 9 Tonga 009

nerved, midrib prominent, lateral nerves very fine, numerous, petiole up to about 2 cm. long. Flowers about 1 cm. wide, in few-flowered, axillary, cymose clusters, petals red, stamens numerous. 137

Vava'u: near village of Mataika, north of Neiafu, May 27, 1953, *Yuncker 16204*. Believed to be a new record for Tonga. Frequent in Fiji.

Tongan name: *mo'onia*.

Garcinia sessilis (Forster) Seemann, Viti, 433, 1862.

Tree, up to 8 m. tall. Leaves opposite, elliptical, acute at both ends, entire, up to 11 cm. or more long and 6 cm. wide, pinnately nerved, lateral nerves very slender, petiole up to about 1 cm. long. Flowers coral or salmon red, sessile, axillary, about 1 cm. wide, four-parted, fragrant.

Tongatapu: *Nelson;* in open forest below Lavengatonga village, Mar. 6, 1953, *Yuncker 15177*.

'Eua: *Lister;* in second-growth forest, near Pangai village, Mar. 25, 1953, *Yuncker 15464*.

Nomuka: open area along road encircling island, Apr. 30, 1953, *Yuncker 15864*.

Vava'u: near Houma village, May 22, 1953, *Yuncker 16118*.

Occasional throughout Tonga. Also in Fiji and Samoa.

Tongan name: *hcilala*.

The flowers are used in leis; the leaves, for medicines.

[824]
[301]
[278]

FAMILY VIOLACEAE

Genus **Melicytus** Forster

Melicytus ramiflorus J. R. and G. Forster, Char. Gen. Pl., 124, 1776.

Shrub or small tree up to 5 m. tall and 15 cm. in diameter. Leaves alternate, elliptic or elliptic-subobovate, acute at both ends, minutely crenate, up to 15 cm. or more long and 7 cm. wide, pinnately nerved, finely venulose-areolate by transmitted light, petiole about 1 cm. long. Flowers greenish white, 3-6 mm. wide, on slender pedicels somewhat longer than flowers, in few-flowered, umbellate clusters.

'Eua: *Lister;* dark, moist forest of ravine north of Fuai plantation, near center of island, Mar. 19, 1953, *Yuncker 15349*. In Tonga, known only from 'Eua. Also grows in New Zealand and on Norfolk Island.

Tongan name: *pualiki*.

Genus **Agatea** A. Gray

Agatea violaris A. Gray, U.S. Expl. Exped., Bot. 1: 89, pl. 7, 1854.

Shrublike, climbing woody plant. Leaves alternate, elliptic or elliptic-subobovate, acuminate, base rounded, obtuse, up to 10 cm. or more long and 5 cm. wide, entire, red-glandular dotted by transmitted light, petioles slender, up to about 2 cm. long. Flowers numerous, in paniculate or racemose, terminal or axillary clusters, petals ciliate.

'Eua: in deep forested ravine north of Fuai plantation, near center of

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137 Tongatapu: *Nelson.*

'Eua: *Lister;* in thicket at margin of forest near center of island, Mar. 19, 1953, *Yuncker 15341.*

Nomuka: in thicket on seaward side of road encircling island, Apr. 30, 1953, *Yuncker 15822.*

Lifuka: in thicket along road between Pangai village and southern end of village, Apr. 28, 1953, *Yuncker 15782.*

Kao: in opening of slope forest, between rocks, May 6, 1953, *Yuncker 15939.*

Vava'u: *Crosby;* on upper rim of seaside cliff northeast of Leimatua on northern side of island, May 20, 1953, *Yuncker 16066.*

Frequent throughout Tonga. Endemic.

Tongan name: *lala vao.*

[824 278 757] An extract of the root[1] is used as a physic.

Family Punicaceae

Genus **Punica** Linnaeus

Punica granatum Linnaeus, Sp. Pl. 472, 1753.

Shrub up to about 2 m. tall, branchlets often spinelike at tip. Leaves opposite, entire, mostly elliptic or oblong, up to 8 cm. long and 1.5 cm. wide, glabrous, obtuse or acutish, base wedge-shaped, petiole short, winged. Flowers axillary, showy, 3-4 cm. wide, petals scarlet, stamens numerous; fruit up to 6 cm. or more thick, very juicy, edible, rind leathery.

Introduced and occasional in villages. A native of Persia, now widely cultivated as an ornamental and for its refreshing fruit.

Tongan name: *pomikanite.*

Family Barringtoniaceae

Genus **Barringtonia** Forster

Barringtonia asiatica (Linnaeus) Kurz, Asiatic Soc. Bengal, Jour. 45(2): 131, 1876.

Large, round-topped tree, up to 8 m. or more tall. Leaves alternate, clustered toward ends of branches, obovate, apex rounded, base wedge-shaped, entire, up to about 30 cm. long, somewhat coriaceous, sessile or subsessile on very short petioles. Flowers large, calyx commonly two-parted, sepals concave, obtuse, persistent on fruit, corolla four-parted, white, early deciduous, stamens numerous, pink and white, on pedicels up to 3 cm. or more long, in terminal, racemose clusters; fruit four-angular, pyramidal, about 8 cm. long, fibrous, buoyant, seed large.

Tongatapu: *Forster; Moseley;* near Ha'akame village, Mar. 12, 1953, *Yuncker 15285.*

'Eua: in open forest on terrace, seaward side of coastal cliff, along trail down to Lokupo, Mar. 27, 1953, *Yuncker 15539.*

1 /Wikstroemia rotundifolia -- Analyst/

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Genus Bruguiera Lamarck

137 **Bruguiera conjugata** (Linnaeus) Merrill, Philippine Jour. Sci. 9C: 118, 1914.

Small tree similar in habit to *Rhizophora*, up to 4 m. or more tall. Leaves alternate, elliptic, acuminate, base decurrent along petiole, up to 12 cm. or more long and 4-5 cm. wide, coriaceous, somewhat glossy, finely pinnately nerved, petiole up to 4 cm. or more long. Flowers greenish yellow, solitary, axillary, about 3 cm. long, calyx lobes very narrowly lanceolate, acute, usually 10, up to 1.5 cm. long; fruit included in calyx tube, seed germinating on tree and forming an elongated radicle.

Nomuka: along shore of central lake, Apr. 30, 1953, *Yuncker 15828*.

Vava'u: *Crosby*.

Occasional near shore but less frequent than *Rhizophora*. From tropical Asia through Malaya to Polynesia.

B. rheedii Blume in Hemsley's list and *B. gymnorhiza* Lam. in Burkill's list.

Tongan names: *tongo, tongo ta'ane*.

[824] [313] [386] The hard and durable wood is used in many ways, and an extract of the flowers furnishes a dye.

Family Combretaceae

Genus Terminalia Linnaeus

Terminalia catappa Linnaeus, Mantissa 1: 128, 1767.

Medium to large tree with whorled, horizontal branches. Leaves clustered toward ends of branches, obovate, obtuse or abruptly acute, base narrowing, narrowly and abruptly obtuse at petiole, entire, up to 25 cm. or more long and 15 cm. wide, pinnately nerved, petioles short and stout. Flowers small, greenish white, in axillary, spikelike clusters near ends of branches; fruit oval, flattened, two-edged, greenish to red, up to about 5 cm. long, flesh thin and edible.

Tongatapu: *U.S. Expl. Exped.*; in open forest near Nualei, Mar. 9, 1953, *Yuncker 15246*; in seaside thicket below Ha'akame village, Mar. 12, 1953, *Yuncker 15286*.

'Eua: in seaward forest on terrace above Houma village, Mar. 26, 1953, *Yuncker 15506*.

Lifuka: roadside near north end of island, Apr. 25, 1953, *Yuncker 15752*.

Tafahi: shore, northeast coast north of Fakafafa moe Tauloto, Dec. 17, 1951, *Hürlimann 601*.

Niuatoputapu: forest on plain southeast of Falehau, alt. 5 m., Dec. 7, 1951, *Hürlimann 385*.

Frequent throughout Tonga, commonly near the shore. From tropical Asia eastward to Polynesia; naturalized in America.

Tongan name: *telie*.

[824] [313] [396] [278] [262] The timber is used for construction purposes, canoes, banana shooks, and so forth; the leaves, for medicine; and the fruit, as food.

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137 [113] Also in Fiji. For a discussion of this species see Lily M. Perry (Jour. Arnold Arboretum 31: 363-364, 1950).

Syzygium clusiaefolium (A. Gray) C. Mueller, Walpers Ann. Bot. Syst. 4: 839. 1857.

Tree, up to 8 m. or more tall. Leaves opposite, oval or oval-obovate, apex rounded, obtuse to short-acute, base acute to cuneate, up to 15 cm. long and 8 cm. wide, coriaceous, entire, pinnately nerved, lateral nerves numerous, very slender, joining with a submarginal nerve, petiole about 1 cm. long, canaliculate. Flowers small, numerous, in large, open, paniculate clusters, borne on trunk and larger branches; fruit ovoid, up to 1 cm. or more in diameter, dark purple, edible.

Tongatapu: swampy area between village of Navutoka and sea, Feb. 27, 1953, *Yuncker 15085.*

'Eua: in open forest near center of island, Mar. 19, 1953, *Yuncker 15386.*

Kao: in forest on rocky slope, May 6, 1953, *Yuncker 15907.*

Vava'u: *Crosby;* near upper rim of seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16108.*

Niuafo'ou: inner slope of main crater, facing large central lake, May 16, 1953, *Yuncker 16005.*

Rather frequent throughout the group. Also in Niue and Samoa.

Eugenia clusiaefolia A. Gr. in Hemsley's list, *fide* Burkill.

Syzygium corynocarpum (A. Gray) C. Mueller, Walpers, Ann. Bot. Syst. 4: 839. 1857.

Shrub or small tree, up to 7 m. or more tall. Leaves opposite, elliptic or oblong-elliptic, bluntly acuminate, base acute, up to 14 or 15 cm. long and 5 cm. wide but mostly smaller, pinnately nerved, lateral nerves slender and submarginally loop-connected, paler on lower surface, petioles 5 mm. long, canaliculate. Flowers sessile or subsessile; fruit elongated, beaked.

Tongatapu: *Home;* in open forested area near village of Niutoua, Mar. 2, 1953, *Yuncker 15166.*

'Eua: in open forest along trail between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15469.*

Nomuka: in clearing near road encircling island, Apr. 30, 1953, *Yuncker 15833.*

Vava'u: *Crosby.*

Occasional throughout Tonga. Also in Fiji and Samoa.

Tongan name: *hehea.*

824 [313] 262 [301] [278] The timber is used for construction purposes; the fruit is eaten and used for leis; and the leaves and bark are used in medicines.

Syzygium cumini (Linnaeus) Skeels, U.S. Dept. Agric., Bur. Pl. Ind., Bull. 248: 25, 1912.

Shrub or medium to large tree. Leaves opposite, oblong to oval, obtuse or acute, 8-14 cm. long and 3-6 cm. wide, rather thick and shining, pinnately nerved. Flowers

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137 shallowly canaliculate. Flowers large, red, on pedicels 1 cm. or less long, in lateral or terminal, racemose clusters; fruit obovoid, 7 cm. or more in diameter, fleshy, red, one-seeded, edible.

Tongatapu: *U.S. Expl. Exped.*; in open woods near village of Lavengatonga, Mar. 6, 1953, *Yuncker 15178*; in open woods near sea below village of Fatai, Mar. 10, 1953, *Yuncker 15265*.

'Eua: in open forest on sea-facing terrace along trail descending to Lokupo, Mar. 27, 1953, *Yuncker 15529*.

Nomuka: in clearing along road encircling island, Apr. 30, 1953, *Yuncker 15858*.

Lifuka: on limestone cliff along eastern side of island near middle, Apr. 27, 1953, *Yuncker 15772*; margin of plantation near north end of island, May 6, 1953, *Yuncker 15988*.

Vava'u: *Crosby*.

Frequent throughout Tonga. A native of Indo-Malaya, now widely grown in warm countries.

Tongan name: *fekika kai*.

[824 313 262 278] The timber is used for construction work; the fruit, as food; and the bark and leaves, in medicines.

Syzygium neurocalyx (A. Gray) Christophersen, B. P. Bishop Mus., Bull. 154: 27, 1938.

Shrub or small tree, up to about 4 m. tall. Leaves opposite, oval-oblong or sub-ovate, obtuse, base rounded, truncate or cordulate, up to 18 cm. long and 8 cm. wide, pinnately nerved, lateral nerves submarginally loop-connected, paler beneath, petioles scarcely 5 mm. long, stout. Flowers large, sessile, solitary or in terminal and axillary, headlike clusters, calyx tube ribbed.

Tongatapu: in open forest below Nualei, Mar. 9, 1953, *Yuncker 15247*. This specimen is sterile and only tentatively referred to this species with which it agrees well in its vegetative characters.

Infrequent. Also in Fiji and Samoa.

Tongan name: *koli*.

[824 301] The fruit is used in leis.

Syzygium richii (A. Gray) Merrill and Perry, Sargentia 1: 77, 1942.

Medium to large tree, up to 8 m. or more tall. Leaves opposite, oval or oval-sub-obovate, abruptly pointed, base rounded, cordulate, up to 25 cm. or more long and 14 cm. wide, coriaceous, pinnately nerved, lateral nerves submarginally loop-connected. Flowers large, in large, branching, axillary clusters, petals four, white, early deciduous, stamens many, long, yellow; fruit ovoid, red.

Tongatapu: in forest near the sea below the village of Niutoua, Mar. 2, 1953, *Yuncker 15140*; in seaside thicket, Blow Hole area near Houma village, June 5, 1953, *Yuncker 16246*.

1 /Syzygium malaccense -- Analyst/

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137 Tongan names for the different varieties: *tanetane, tanetane tamaline, tanetane kau'uli, tanetane maelieti.*

FAMILY UMBELLIFERAE

Genus **Centella** Linnaeus

Centella asiatica (Linnaeus) Urban, in Martius Fl. Brasil. 11(1): 287, 1879.

Low, prostrate, silky-hairy herb, widely spreading by slender, runnerlike stems, rooting at nodes. Leaves clustered at nodes, orbicular-ovate, rather thick, crenately toothed, base deeply cordate, petioles long. Flowers very small, white or pinkish, nearly sessile, in axillary, few-flowered, headlike umbels; fruit round, compressed, ribbed.

Tongatapu: in sand, along strand, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15010;* in sandy soil just above high-tide limit, in thicket near Fu'amotu village, Mar. 4, 1953, *Yuncker 15146.*

'Eua: *Lister;* in an eroded area near ridge forest, on eastern side of island, Mar. 24, 1953, *Yuncker 15448.*

Kao: in open alpine area above upper forest limit, about 950 m. alt., May 6, 1953, *Yuncker 15941.*

Vava'u: *Barclay; Crosby.*

Tafahi: township of Tafahi to landing place Faihavanui, alt. 100 m., Dec. 15, 1951, *Hürlimann 539.*

Found throughout Tonga as a frequent plantation and waste-area weed. Pantropic.

Hydrocotyle asiatica L. in Hemsley's and Burkill's lists.

Tongan name: *tono.*

[824 278] The leaves are used medicinally, as poultices, for one thing.

Genus **Apium** Linnaeus

Apium leptophyllum (Persoon) F. Mueller, ex Bentham, Fl. Australiensis 2: 372, 1866.

Erect, glabrous herb. Leaves alternate, divided into numerous, filiform divisions. Flowers minute, white, in terminal or leaf-opposed, few-flowered umbels; the fruit very small, ovate, compressed, ribbed.

Tongatapu: weedy area between Fu'amotu village and sea, Mar. 4, 1953, *Yuncker 15155.*

'Eua: grassy area near center of island, Mar. 22, 1953, *Yuncker 15413.*

Vava'u: *Crosby.*

Occasional throughout Tonga as a plantation and waste-area weed. A common weed of tropical and subtropical America, now widespread in the Pacific area.

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Niuatoputapu: range above Hihifo, alt. 100 m., Dec. 12, 1951, *Hürlimann 345;* forest, coastal flat south of Falehau, Dec. 28, 1951, *Hürlimann 642.* 137

Southeastern Asia, Malaysia, New Caledonia to Samoa.

Maba elliptica Forst. in Hemsley's and Burkill's lists.

Diospyros ferrea (Willdenow) Bakhuizen, Gard. Bull. Straits Settlem. 7: 162, 1932.

Tree up to 6 m. or more tall. Leaves alternate, coriaceous, glossy, somewhat hairy or glabrate, elliptic, ovate, or elliptic-subobovate, the apex rounded or slightly pointed, base acute or obtusish, up to 8 cm. long and 4 cm. wide, petiole scarcely 5 mm. long. Flowers small, greenish yellow, three-parted, hairy, in small, axillary, branching clusters; fruit orange, red, or purple, elliptical or globose, up to 1 cm. or more in diameter, edible.

Tongatapu: in forested area between Niutoua village and the sea, Mar. 2, 1953, *Yuncker 15124.*

'Eua: *Lister;* in seaward margin of forest above Houma village, Mar. 26, 1953, *Yuncker 15493.*

Nomuka: in thicket near shore of central lake, Apr. 30, 1953, *Yuncker 15842.*

Lifuka: in thicket near sea, north of Pangai village, Apr. 25, 1953, *Yuncker 15735.*

Vava'u: in thicket near sea below Houma village, May 22, 1953, *Yuncker 16131;* at summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16144.*

Frequent throughout Tonga. India and Ceylon eastward to the Hawaiian Islands.

Maba buxifolia (Rottb.) Pers. in Hemsley's list.

Tongan name: *kanume.*

The wood is used in handicraft work and the bark in preparing medicines. [824 313 278]

Diospyros lateriflora (Hiern) Bakhuizen, Jard. Bot. Buitenzorg, Bull. III, 15: 8, in key, 1936.

Tree, up to 7 m. or more tall. Leaves alternate, entire, elliptic-ovate, coriaceous, glossy, up to 16 cm. or more long and 9 cm. wide, apex rounded or bluntly acute, base acute, pinnately nerved, petiole scarcely 1 cm. long. Flowers small, hairy, in small, compact, axillary clusters; fruit elliptical, pubescent, up to 4 cm. long.

Tongatapu: in open forest below Nualei village, Mar. 9, 1953, *Yuncker 15236.*

'Eua: in open forest about center of island, Mar. 19, 1953, *Yuncker 15355.*

Lifuka: in seaside thicket near southern end of island, Apr. 28, 1953, *Yuncker 15777.*

Vava'u: *Crosby.*

Occasional throughout Tonga; also in Fiji.

Maba lateriflora Hiern of Burkill's list.

Tongan name: *mapa.*

The fruit is used in leis.

[824 301]

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The genus *Geniostoma* is in need of revision, and some of the specimens listed are only tentatively identified as indicated.

The Tongans, so far as I learned, do not distinguish between the different species but call all of them *te'epilo'amani*.

The bark, when bruised, and the flowers, have a disagreeable odor; they are used in medicines.

Genus **Fagraea** Thunberg

Fagraea berteriana A. Gray, Linn. Soc. Bot., Jour. 1: 98, 1857.

Medium to large tree. Leaves simple, opposite, oval-obovate, the apex rounded, obtuse, base cuneate, entire, rather thick, pinnately nerved, midrib stout, lateral branches slender and obscure, up to 15 cm. or more long and 8 cm. wide, petiole up to 2.5 cm. long. Flowers fleshy, very fragrant, nearly 5 cm. wide, in axillary, cymose clusters, corolla white turning yellow, tubular, the tube up to 5 cm. long; fruit ellipsoidal, about 3 cm. long, bright red when ripe.

Tongatapu: *Moseley;* in thicket near village of Nualei, Mar. 9, 1953, *Yuncker 15245.*

'Eua: *Lister,* in open forested area near center of island, Mar. 18, 1953, *Yuncker 15334.*

Vava'u: *Crosby.*

Tafahi: fog forest, former mouth of volcano Piu 'o Tafahi, alt. 580 m., Dec. 11, 1951, *Hürlimann 440.*

Frequent in open forests throughout Tonga. From New Caledonia, Fiji and Samoa to the Marquesas.

Tongan name: *pua.*

The flowers are used in leis.

Family APOCYNACEAE

Genus **Melodinus** Forster

Melodinus vitiense Rolfe, Jour. Bot. 21: 201, 1883.

Woody, vinelike plant. Leaves opposite, elliptic, apex bluntly pointed, base acute, up to 9 cm. or more long and 4 cm. wide, rather thick, glossy above, pinnately nerved, lateral nerves slender and submarginally loop-connected, petioles about 5 mm. long. Flowers about 6-8 mm. long, short-pedicellate, in axillary and terminal, short-pedunculate, few-flowered clusters, corolla tubular, yellow.

Tongatapu: *Forster; Nelson.*

'Eua: *Lister;* in open forest near center of island, Mar. 19, 1953, *Yuncker 15359;* climbing in thicket along trail on terrace of seaside cliff above Houma village, Mar. 26, 1953, *Yuncker 15498.*

Vava'u: *Crosby.*

Occasional. New Caledonia and Fiji.

M. scandens Forst. in Hemsley's list.

1 /?Geniostoma vitiense -- Analyst/

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Genus **Catharanthus** G. Don

Catharanthus roseus (Linnaeus) G. Don, Gen. Syst. 4: 95, 1838. 137

Perennial herb, stem up to 50 cm. or more tall. Leaves opposite, oblong, apex rounded, tipped with a short point, base acute, up to 8 cm. long and 2-3 cm. wide. Flowers in pairs, axillary, corolla white, pink, or white with a red center, puberulent without, salverform, tube up to 3 cm. long; fruit paired follicles, up to 3 cm. long, puberulent.

Tongatapu: roadside near Nuku'alofa, Mar. 10, 1953, *Yuncker 16259*.

'Eua: *Lister*.

Frequent about villages and cemeteries as an ornamental throughout the group. Also naturalized along roadsides and waste areas. A tropical American species of worldwide distribution.

Vinca rosea L. in Hemsley's and Burkill's lists.

Parts of the plant are used in the preparation of medicines.

Tongan names: *lolie, valeti*. [824] [278]

Genus **Ervatamia** (A. de Candolle) Stapf

Ervatamia orientalis (R. Brown) Turrill, Linn. Soc. Bot., Jour. 43: 32, 1915.

Small tree, up to 5 m. or more tall, with white latex. Leaves rather thin, elliptical, acute at both ends, up to 15 cm. or more long and 6 cm. wide, glabrous, entire, pinnately nerved, petiole 1-2 cm. long. Flowers in axillary or terminal clusters, corolla white, tubular; fruits orange, paired, podlike, divergent.

Tongatapu: *Nelson*; in open forest between village of Niutou and sea, Mar. 2, 1953, *Yuncker 15123*.

'Eua: *Lister*.

Vava'u: *Crosby*.

Niuatoputapu: Falehau, alt. 5 m., Dec. 18, 1951, *R. Hinango* (*Hürlimann 622*).

Occasional. Fiji to the Society Islands and Samoa.

Tabernaemontana orientalis R. Br. in Hemsley's and Burkill's lists.

Tongan name: *te'ete'emanu*.

Genus **Alyxia** R. Brown

Alyxia bracteolosa Rich, ex A. Gray, Am. Acad. Arts Sci., Proc. 5: 332, 1862.

Woody vine, with white latex. Leaves in whorls of three, oblong-elliptic, apex rounded or bluntly short-pointed, base cuneate, entire, up to 12 cm. long and 3 cm. wide, pinnately nerved, lateral nerves slender and obscure, petiole scarcely 1 cm. long, canaliculate, narrowly margined by decurrent blade margins.

Tongatapu: *Nelson*.

'Eua: climbing in forest on sea-facing terrace along trail to Lokupo, Mar. 27, 1953, *Yuncker 15515*.

Occasional. Also in Fiji and Samoa.

Tongan name: *kulu*.

The leafy branches are used in making leis. [824] [301]

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137 Lifuka: in thicket near sea north of Pangai village, Apr. 25, 1953, *Yuncker 15741.*

Kao: in open forest near old plantation on lower slope, May 6, 1953, *Yuncker 15970.*

Vava'u: *Crosby; Harvey;* along upper edge of coastal limestone cliff above Leimatua, May 25, 1953, *Yuncker 16079.*

Frequent in thickets throughout Tonga. Fiji eastward to the Marquesas.

All of the material collected is referable to this variety and it is believed to be the same plant listed by Hemsley and Burkill as *P. taitensis* Schau.

Tongan name: *volovalo.*

[824] [278] The leaves[1] are used in preparing medicines.

Genus **Vitex** Linnaeus

Vitex trifolia Linnaeus var. **bicolor** (Willdenow) Moldenke, Known Geogr. Distrib. Verb., 79, 1942.

Shrub or small tree up to 3 m. tall, twigs densely tomentose. Leaves opposite, mostly palmately five-compound, leaflets elliptic-lanceolate, acuminate, base acute, lateral leaflets smaller than terminal one, up to 10 cm. long and 3 cm. wide, pinnately nerved, dark above, lower surface densely white-tomentose. Flowers about 5 mm. long, lilac or lavender, short-pedicellate, in large, branching, axillary or terminal, tomentose, paniculate clusters.

Tongatapu: *Forster; Moseley;* in thicket near sea, Sopu, west of Nuku-'alofa, Feb. 25, 1953, *Yuncker 15011.*

Nomuka: in thicket on seaward side of road encircling island, Apr. 30, 1953, *Yuncker 15801.*

Vava'u: *Crosby.*

Occasional throughout Tonga. From eastern Africa and India through Malaysia to Polynesia.

Presumably the *V. trifolia* L. of Hemsley's and Burkill's lists.

Genus **Faradaya** F. v. Mueller

Faradaya amicorum (Seemann) Seemann, Jour. Bot. 3: 258, 1865.

Woody, vinelike shrub climbing in trees. Leaves simple, opposite, ovate or elliptic-obovate, abruptly short-acuminate, base acute, up to 25 cm. or more long and 15 cm. wide, pinnately nerved, petiole 3-4 cm. long. Flowers large, white, showy, in terminal panicles, corolla long-tubular, with four-parted limb; fruit up to four, one-seeded, woody nutlets.

Tongatapu: *Banks and Solander;* in forest below Nualei, climbing in tree, Mar. 9, 1953, *Yuncker 15242.*

'Eua: *Lister;* climbing in tree, edge of forest near the center of the island, Mar. 19, 1953, *Yuncker 15368.*

1 /Premna taitensis -- Analyst/

76: Yuncker N-4,5 (1953) 1959 OU9 Tonga OU9

Genus **Ocimum** Linnaeus

137 **Ocimum basilicum** Linnaeus, Sp. Pl., 597, 1753.

Free branching, square-stemmed, pubescent, aromatic herb, up to 60 cm. or more tall. Leaves opposite, oval-ovate, acute at both ends, up to 3 cm. or more long, finely toothed, minutely dotted, petiole slender. Flowers short-pedicellate, nodding, in interrupted, terminal spikes, calyx bilabiate, purplish, membranous, veiny, with suborbicular, acute upper lip and aristate lower lip, corolla white or essentially so; fruit of four dry nutlets, which become mucilaginous when wet.

Tongatapu: *Home.*
'Eua: *Lister.*
Vava'u: *Crosby.*
From tropical Asia to Polynesia.

Ocimum gratissimum Linnaeus, Sp. Pl., 1197, 1753.

Sub-shrubby, up to 3 m. or more tall. Leaves ovate-elliptical, pointed at both ends, up to 10 cm. long and 4 cm. wide, coarsely crenate-serrate, usually pubescent, petioles up to 5 cm. long. Flowers closely verticillate, on slender pedicels up to 3 mm. or more long, in spicate clusters up to 15 cm. long.

Tongatapu: *Moseley.*
Introduced. Tropical Africa, Ceylon, and the East Indies.

Family SOLANACEAE

Genus **Physalis** Linnaeus

Physalis angulata Linnaeus, Sp. Pl., 183, 1753.

Erect, glabrous, branching herb with angular stems, up to 80 cm. or more tall. Leaves alternate, elliptic-ovate, acuminate, base ovate, irregularly toothed or entire, up to 8 cm. or more long and 4-5 cm. wide. Flowers on slender, axillary pedicels about 1 cm. long, 5-6 cm. long, corolla yellow, fruit fleshy, about 1 cm. in diameter, enclosed by inflated, ovoid calyx, up to about 3 cm. long.

Tongatapu: weed in plantation near village of Lavutoka, Feb. 27, 1953, *Yuncker 15098.*

An occasional plantation weed. A tropical American species now of wide distribution as a weed in warm countries.

Tongan name: *polo pa.*

[824] [278] The leaves are used in preparing medicines.

Physalis minima Linnaeus, Sp. Pl., 183, 1753.

Low, much-branched, somewhat sprawling herb. Leaves mostly alternate, oval-ovate, acute at both ends, up to about 6 cm. long and 3 cm. wide, margin entire or somewhat wavy, petioles slender, nearly as long as leaves. Flowers solitary, axillary, corolla yellow with a darker center; fruit berrylike, enclosed in papery, inflated, baglike calyx.

'Eua: weed in margin of old plantation, along trail between Pangai village and Fuai, Mar. 25, 1953, *Yuncker 15463.*

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Vava'u: *Crosby.*

Occasional as a plantation weed. Pantropic.

Tongan name: *polo pa.* 137

Physalis peruviana Linnaeus, Sp. Pl., ed. 2, 1670, 1763.

Widely branching, pubescent herb, up to 50 cm. or more tall. Leaves alternate, ovate, apex acuminate, base rounded or cordate, irregularly sinuate-toothed, up to 12 cm. or more long and 9 cm. wide, petioles up to 4 cm. long. Flowers solitary, axillary, pedicels slender, 1-2 cm. long, corolla yellow with a brownish-purple center; berry yellow, many-seeded, enclosed in a veiny, inflated, parchmentlike case about 3 cm. in diameter.

Tongatapu: *Moseley;* in plantation near Navutoka village, Feb. 27, 1953, *Yuncker 15087.*

Vava'u: *Crosby.*

Occasional as a plantation weed. A South American plant now widely distributed in warm countries as a weed.

Tongan name: *ku'usi.*

The leaves are used in preparing medicines. [824] [278]

Genus **Capsicum** Linnaeus

Capsicum frutescens Linnaeus, Sp. Pl., 189, 1753.

Strongly branched, sub-shrubby plant, up to about 1.5 m. tall. Leaves alternate, ovate-lanceolate, acuminate, base acute, entire or slightly undulate, smooth or slightly pubescent, petioles mostly 1-2 cm. long. Flowers small, white, solitary or paired, axillary, pedicels about 2 cm. long; fruit erect, ovoid, about 2.5 cm. long, bright red when ripe, very pungent when eaten.

Tongatapu: *Moseley;* in waste area near Hufangalupe, Feb. 26, 1953, *Yuncker 15037.*

'Eua: *Lister;* in a small clearing in forest near center of island, Mar. 19, 1953, *Yuncker 15354.*

Vava'u: *Crosby.*

Occasional throughout Tonga. A tropical American species now pantropic.

Tongan names: *polo, polo fifisi.*

The fruit is used as a food flavoring. [824] [263]

Genus **Solanum** Linnaeus

Solanum amicorum Bentham, Hook. London, Jour. Bot. 2: 227, 1843.

Shrub, the branches sulcate. Leaves ovate, obscurely angular-sinuate, glabrate above, reticulate-veiny beneath; nerves, petiole and raceme branches rough-tomentose. Racemes lateral, many-flowered, calyx five-toothed, corolla deeply five-parted, lobes lanceolate, acute.

Tongatapu: *Forster; Nelson.*

Vava'u: *Barclay; Crosby.*

No specimens of this or of the following species were found. They are included on the basis of Hemsley's and Burkill's reports. Pacific Islands.

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137 **Solanum forsteri** Seemann, Jour. Bot. 1: 207, 1863.

Herbaceous, hairy glabrescent annual plant. Leaves ovate, acuminate, entire or sinuate-dentate, base cordate or attenuate into petiole. Cymes three- to six-flowered, calyx lobes ovate, acute, corolla puberulent without; berry globose, smooth.

Vava'u: *Barclay; Crosby.*

Easter Island, Tahiti.

Solanum nigrum Linnaeus, Sp. Pl., 186, 1753.

Glabrous or slightly pubescent, widely branching herb, up to about 80 cm. tall. Leaves alternate, elliptic-ovate, acute at both ends, entire or somewhat sinuate, petioles mostly 1-2 cm. long. Flowers small, white, in long-stalked, axillary, umbellate clusters; fruit small, fleshy, globose, black when ripe.

Tongatapu: weed in plantation below village of Ha'akame, Mar. 12, 1953, *Yuncker 15272.*

Frequent throughout Tonga as a plantation weed. A European species now widely distributed as a weed in temperate and tropical countries.

S. olearaceum Dunal in Hemsley's list.

Tongan name: *polo kai.*

Solanum uporo Dunal, in DC. Prodr. 13: 138, 1852.

Sub-shrubby herbaceous plant, up to 2 m. or more tall, stems glabrous or nearly so. Leaves elliptic or ovate, acuminate, base acute to cuneate, up to 15 cm. or more long and 8 cm. wide, entire or slightly sinuate, petioles up to 3 cm. long. Flowers in branching, axillary clusters, corolla yellowish white, about 1 cm. wide, stellate-pubescent on outside; fruit up to 2 cm. or more in diameter, ovoid or subglobose, fleshy, bright red.

Tongatapu: in thicket near sea on eastern side of island near Niutoua village, Mar. 2, 1953, *Yuncker 15131.*

'Eua: *Lister;* in thicket along road between Mua and Ha'aluma, Apr. 1, 1953, *Yuncker 15584.*

Vava'u: *Barclay.*

Occasional. Tahiti, Rarotonga.

Tongan name: *polo tonga.*

[824] [278] The leaves are used in the preparation of medicines.

Solanum verbascifolium Linnaeus var. **auriculatum** (Aiton) Kuntze, Rev. Gen. Pl. 1: 455, 1891.

Small, densely pale-pubescent tree, up to 8 m. tall. Leaves alternate, elliptic-lanceolate, acuminate, base acute, pinnately nerved, nerves conspicuous and submarginally loop-connected, up to 30 cm. long and 9 cm. wide, petiole 2-5 cm. long, with large, auriculate, stipule-like bracts at the base. Flowers about 2 cm. wide, in dense, many-flowered, long-pedunculate terminal, paniculate clusters, corolla lavender.

Tongatapu: in thicket near Vaini village, Feb. 26, 1953, *Yuncker 15043.*

'Eua: *Parks 16086;* open margin of forest above Fuai plantation near center of island, Mar. 18, 1953, *Yuncker 15325.*

Nomuka: in thicket along road encircling island, Apr. 30, 1953, *Yuncker 15818.*

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137 Tongatapu: *Forster;* in thicket below Nualei village, Mar. 9, 1953, *Yuncker 15238.*

'Eua: *Lister;* in open forest near center of island, Mar. 18, 1953, *Yuncker 15328;* in forest along trail to "Smoky Hole" above Fuai, Mar. 31, 1953, *Yuncker 15573.*

Lifuka: in thicket along road near south end of island, Apr. 28, 1953, *Yuncker 15781.*

Kao: in lower forest margin, May 6, 1953, *Yuncker 15963.*

Vava'u: *Crosby;* in thicket along summit of seaside cliff below village of Houma, May 22, 1953, *Yuncker 16120.*

Niuafo'ou: in thicket a short distance above upper limit of recent lava flows, May 16, 1953, *Yuncker 15997.*

Frequent throughout Tonga. Micronesia and New Caledonia eastward to Tuamotu Islands.

Tongan names: *manonu, takafalu.*

[824] [278] The bark is used in the preparation of medicines.

Genus **Randia** Linnaeus

Randia cochinchinensis (Loureiro) Merrill, Am. Philos. Soc., Trans. 24(2): 365, 1935.

Glabrous shrub, 1-2 m. tall. Leaves opposite, elliptic or elliptic-ovate, acute, base acute-decurrent, up to 15 cm. long and 6 cm. wide, pinnately nerved, petiole ridged by decurrent blade margins, about 1 cm. long, stipules small, connate. Flowers white, in branching, axillary clusters up to 4-5 cm. or more long; fruit red, obovoid, 5-8 mm. long, crowned by calyx.

Tongatapu: *Moseley.*

Vava'u: *Harvey; Barclay; Crosby;* in thicket on upper rim of seaside cliff above Ha'alaufuli, May 21, 1953, *Yuncker 16098;* along trail leading to summit of Talau, west of Neiafu, May 23, 1953, *Yuncker 16143.*

Occasional. Tropical Asia, Malaysia, Micronesia, and Polynesia.

R. coffeoides Benth. and Hook. in Hemsley's and Burkill's lists.

Randia crosbyi Burkill, Linn. Soc. Bot., Jour. 35: 41, 1901.

Small tree, up to 4 m. or more tall. Leaves opposite, elliptic or oblong-elliptic, acute or short-acuminate, base oblique, obtuse or acutish, glabrous, entire, up to 15-18 cm. long and 6 cm. wide, pinnately nerved, petiole up to 1 cm. long. Flowers few, small, on slender pedicels up to 1-1.5 cm. long, in small, axillary clusters; fruit globose, about 1 cm. in diameter, crowned by pubescent calyx.

Vava'u: *Crosby 76;* in thicket along upper rim of seaside cliff on northwestern side of island, May 25, 1953, *Yuncker 16172.*

Infrequent. Endemic.

1 /Tarenna sambucina -- Analyst/

76: Yuncker N-4,5 (1953) 1959 OU9 Tonga OU9

'Eua: *Lister.*

Lifuka: in seaside thicket north of Pangai village, Apr. 25, 1953, *Yuncker 15747;* in seaside thicket near southern end of island, Apr. 28, 1953, *Yuncker 15790.*

Kao: on lower rocky slope in clearing, May 6, 1953, *Yuncker 15878.*

Vava'u: *Crosby; Harvey.*

Niuafo'ou: near shore of central crater lake, May 16, 1953, *Yuncker 16011.*

Common near the shore throughout Tonga. An Indo-Malaysian strand species extending into Polynesia.

Tongan name: *puopua.*

The wood is used for general construction work, banana shooks, and so forth; the bark, in preparing medicines; and the flowers, to perfume oils.

Genus **Timonius** de Candolle

Timonius polygamus (Forster f.) Robinson, Am. Acad. Arts Sci., Proc. 45: 394, 1910.

Shrub, about 2 m. or more tall. Leaves opposite, obovate, apex rounded, obtuse or slightly pointed, base acute or obtusish, rather thick, glossy above, up to 10 cm. or more long and 5 cm. wide, pinnately nerved, petiole scarcely 5 mm. long. Flowers white, pubescent, solitary or several in cymose clusters on rather long, axillary peduncles; fruit subglobose, about 1 cm. long, crowned with calyx.

Vava'u: *Crosby;* along upper edge of limestone coastal cliff above Leimatua, May 25, 1953, *Yuncker 16075.*

Occasional. Eastern Fiji to the Tuamotus and Henderson Island.

T. forsteri DC. in Burkill's list.

Genus **Coffea** Linnaeus

Coffea arabica Linnaeus, Sp. Pl., 172, 1753.

Shrub or small tree, about 2-3 m. tall. Leaves opposite, oblong-elliptic to subobovate, glossy, acuminate, base acute, glabrous, pinnately nerved, petiole about 1 cm. long. Flowers white, fragrant, short-pedicellate, in axillary clusters; fruit ovoid, red, two-seeded.

Tongatapu: in plantation below Nualei village, Mar. 9, 1953, *Yuncker 15226.*

Occasional in villages or plantations. A tropical African species now widely grown in tropical countries.

Tongan name: *kofi.*

Genus **Ixora** Linnaeus

Ixora calcicola A. C. Smith, sp. nov. (fig. 13).

Frutex ad 1.5 m. altus, ramulis glabris teretibus rugulosis cinereis apices versus circiter 2 mm. diametro; stipulis libreis glabris circiter 4 mm. longis e basi late ovato in aristam rigidam ad 2 mm. longam angustatis, pilis supra cicatricibus castaneis circiter 1 mm. longis; foliis glabris, petiolis semiteretibus rugulosis 3-6 mm. longis, laminis papyraceis

1 /Guettarda speciosa -- An lyst/

76: Yuncker N-4,5 (1953) 1959 0U9 Tonga 0U9

137 *Psychotria macrocalyx* A. Gray (type from Tongatapu, *U. S. Expl. Exped.*, U.S. Nat. Herb. no. 52345) has leaves as small as those of the new species but acuminate and with more sharply ascending secondaries; its fruit has an erect and obviously dentate calyx limb nearly 5 mm. long, and its stipule lobes are very narrow, these characters readily distinguishing it from our species.

Psychotria macrocalyx A. Gray, Am. Acad. Arts Sci., Proc. 4: 46, 1860.

Glabrous shrub, the branches slender. Leaves lanceolate or oblong-lanceolate, up to 8 cm. long and 3.5 cm. wide, acuminate, base narrowed to petiole, rather papery, stipular lobes narrow. Flowers in terminal clusters.

Tongatapu: *U. S. Expl. Exped.* Endemic.

Genus **Carinta** Safford

Carinta herbacea (Jacquin) W. F. Wight, ex Safford, U.S. Nat. Herb., Contrib. 9: 216, 1905.

Small, glabrous herb with slender, creeping stems rooting at the nodes. Leaves opposite, rounded, deeply cordate, about 2.5 cm. wide, palmately nerved, entire, the petioles commonly about as long as the blade. Flowers small, white, in few-flowered, axillary, pedunculate umbels; the fruit fleshy, red.

'Eua: *Lister;* on moist forest floor in broken sunlight, near center of island, Mar. 18, 1953, *Yuncker 15317.*

Vava'u: *Crosby.*

Occasional in moist forested areas. Pantropic.

Geophila reniformis D. Don in Hemsley's and Burkill's lists.

Tongan name: *tono.*

[824] [278] The leaves are used in medicines.

Genus **Gynochthodes** Blume

Gynochthodes ovalifolia (Valeton) Kanehira var. **smithii** Fosberg, Torrey Bot. Club, Bull. 67: 421, 1940.

Vigorous, glabrous, woody vine. Leaves opposite, oval-ovate, acuminate, base acute, entire, up to 8 cm. or more long and 6 cm. wide, pinnately nerved, petioles 1-3 cm. long, slightly ridged by decurrent blade margins.

'Eua: climbing in thicket, margin of forest on seaward terrace of coastal cliff on way down to Lokupo, Mar. 27, 1953, *Yuncker 15520.*

Apparently very infrequent. Also in Fiji and Samoa.

Genus **Morinda** Linnaeus

Morinda citrifolia Linnaeus, Sp. Pl., 176, 1753.

Shrub or small tree with four-sided, glabrous branches. Leaves opposite, broadly oval or slightly obovate, pubescent when young, acute at both ends, up to 30 cm. long and 15

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cm. wide, petioles 1-2 cm. long, narrowly ridged by decurrent blade margins, stipules connate. Flowers white, in a globose, fleshy, headlike, pedunculate, axillary cluster; fruit globose-ovoid, about the size of an egg, fleshy and yellowish white when mature. 137

Tongatapu: *Forster;* in thicket near Vaini village, Feb. 26, 1953, *Yuncker 15037, 15038.*

'Eua: *Lister;* in open forest near center of island, Mar. 19, 1953, *Yuncker 15367.*

Lifuka: clearing near east side of island, along cross-island road between Pangai and eastern coast, Apr. 27, 1953, *Yuncker 15756.*

Vava'u: *Crosby;* along trail to summit of Talau, west of Neiafu, May 23, 1953. *Yuncker 16146.*

Common in thickets at lower altitudes throughout Tonga. From India through Malaya to Polynesia.

Tongan name: *nonu.*

The roots furnish a dye; the leaves are used as a remedy for boils; and various parts of the plant are used in medicines. [824] [386] [757] [278]

Morinda umbellata Linnaeus var. **forsteri** (Seemann) Fosberg, in Smith, Sargentia: 1: 123, 1942.

Stout, woody vine. Leaves opposite, elliptic, acute to acuminate, base acute, up to 8 cm. or more long and 4 cm. wide, somewhat coriaceous, pinnately nerved, lateral nerves submarginally loop-connected, petiole 1-1.5 cm. long, narrowly laterally ridged by the decurrent blade margins. Flowers white, in a fleshy, pedunculate, axillary, globose, headlike cluster; fruit globose-ovoid, less than 1 cm. in diameter.

Tongatapu: *Home.*

'Eua: *Lister;* in thicket along trail to summit of eastern ridge, Mar. 30, 1953, *Yuncker 15553.*

Kao: climbing in open forest on steep rocky slope, May 6, 1953, *Yuncker 15894, 15895.*

Vava'u: *Crosby.*

Occasional in forested area. New Hebrides, Fiji, Polynesia.

Genus **Borreria** G. F. W. Meyer

Borreria laevis (Lamarck) Grisebach, K. Ges. Wiss. Goet., Abh. 7: 231, 1857.

Low, branching, ascending plant, slightly woody at the base. Leaves opposite, elliptic-lanceolate, sharply acuminate, base cuneate, mostly 2-4 cm. long and 5 mm. wide, pinnately nerved, nerves prominent, subsessile, stipules connate, with filamentous processes. Flowers small, white, in verticillate, axillary clusters.

Tongatapu: frequent in calcareous soil near sea, Sopu, west of Nuku'alofa, Feb. 25, 1953, *Yuncker 15007.*

'Eua: in pastured area near center of island, Mar. 22, 1953, *Yuncker 15428.*

Rather frequent as a weed in waste areas and clearings throughout Tonga. A tropical American species now widespread in tropical countries.

1 /Morinda citrifolia -- Analyst/

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'Eua: forming a thicket along strand just above high-tide limit, Lokupo, Mar. 27, 1953, *Yuncker 15535.* 137

Lifuka: in thicket, strand, north of Pangai village, Apr. 26, 1953, *Yuncker 15739.*

Vava'u: upper rim of coastal limestone cliff above Leimatua, May 25, 1953, *Yuncker 16080.*

Niuafo'ou: in thicket, summit of main crater rim, May 16, 1953, *Yuncker 16016.*

Common throughout Tonga along the strand (fig. 16). From India to Australia and Polynesia.

S. kocnigii Vahl in Hemsley's list.

Tongan names: *ngahu, ngahu molemole.*

The bark is used medicinally "to cure a leprosy-like disease and ringworm." [824 278 757]

Scaevola frutescens var. **sericea** (Forster) Merrill, Philippine Jour. Sci. 7C: 354, 1912.

All parts of the plant densely silky pubescent.

Vava'u: along upper rim of seaside limestone cliff above Leimatua, May 20, 1953, *Yuncker 16077.*

Niuafo'ou: on upper rim of main crater, in thicket May 16, 1953, *Yuncker 16014.*

Occasional. Philippines to Polynesia.

Scaevola porrecta A. C. Smith, sp. nov. (fig. 17).

Herba suffruticosa porrecta ut videtur pauciramosa, ramulis teretibus pilis 1-2 mm. longis pallidis molliter vestitis; foliis alternatis, petiolis 1-2 cm. longis ut ramulis pilosis ad basim ampliatam anguste alatis, laminis in sicco subcoriaceis (in vivo forsan carnosis) fusco-olivaceis elliptico-lanceolatis, 4-6 (-7) cm. longis, 1.2-2.5 (-3) cm. latis, basi longe attenuatis et in petiolum decurrentibus, apice calloso-acutis, margine manifeste crenato-serratis (dentibus 2-3 per centimetrum callosis), utrinque pilis pallidis mollibus circiter 1 mm. longis adpressis ornatis, costa supra subplana subtus elevata, nervis aliis immersis; floribus in axillis bractearum solitariis sessilibus in spicis terminalibus laxis paucifloris 2-4.5 cm. longis dispositis, bracteis foliaceis oblongis apice obtusis callosis utrinque pilosis, maximis ad 20 mm. longis et 6 mm. latis, superioribus minoribus, bracteolis lateralibus similibus lanceolatis ad 8 × 1.5 mm.; calyce pilis numerosis pallidis 4-5 mm. longis basi circumdato, tubo ellipsoideo glabro saepe ruguloso 2-3 mm. longo 1.5-2 mm. lato, limbo erecto plerumque 0.5-1 mm. longo, lobis 5 praeter marginem ciliatum glabris plerumque parvis inconspicuis ad 0.5 mm. longis, lobo unico interdum lanceolato acuto ad 2.5 mm. longo; ovario biloculari, ovulis in quoque loculo solitariis; corolla alba membranacea 16-18 mm. longa, tubo utrinque inconspicue piloso intus faucibus setis deflexis 0.7-1 mm. longis paucis diffuse capitellatis obsito, lobis quam tubo paullo longioribus ovato-lanceolatis alis inclusis 2.5-3.5 mm. latis apice calloso-brevi-acuminatis utrinque glabris vel extus parce pilosis, alis membranaceis undulatis circiter 1 mm. latis; staminibus glabris, filamentis gracilibus 3.5-5 mm. longis, antheris oblongo-ellipsoideis 1.3-1.7 mm. longis; stylo gracili circiter 9 mm. longo copiose breviter piloso apice curvato incrassato, indusio membranaceo circiter 2 mm. diametro minute ciliolato, stigmate late cuneato complanato truncato; fructibus non visis.

1 /Scaevola frutescens -- Analyst/

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Fish nets (*finaki*). A fish net is made from the leaves of the coconut palm. The roots are plaited into a round net very much like a lobster net; when ready it is sunk in the sea, weighed down by a stone or some heavy weight. The fish swim into an opening in the net.

USES OF THE COCONUT PALM

The coconut tree is considered by the natives to be the most useful tree in Tonga. It is indispensable in house building, and the number of articles made from its wood and leaves is remarkable. The heart of the tree is used for making walking sticks, the bark for medicine, the roots for a kind of fish net called *finaki*, the leaves for baskets, thatching houses, and making mats and flooring. The uses of the fruit are innumerable.

As a medicine the fruit is given to pregnant women to increase the supply of breast milk. For this the green nuts are used. A newborn child is always given *namoa*, which is made from the roasted flesh of the ripe nut. This roasted flesh is chewed by someone, usually a woman, and when taken from the mouth is rolled in a piece of *fetaaki*, squeezed, and the juice given to the child. This is his only food for four days.

Ripe coconuts are valuable for copra, which is the dried flesh. This is sold to European markets largely, where it is used for soap, candles, oils, and a variety of products. The shells of the coconut are burned and made into charcoal (*malala*) for ironing. Kava cups also are made from the shells.

No native food is considered complete without the presence of coconut in one form or another. Yams, fish, and bananas are usually cooked in the milk extracted from the flesh of the ripe coconut and strained through coconut fiber.

Brooms are made from the ribs of the leaf, and the leaf stem is used for stirring oil, also as weights for tapa which is spread on the ground for printing. The bark (*kaka*), which surrounds the leaves at the body of the palm, is used to make bags for wrapping arrowroot and medicines.

The several varieties of coconut palms have different uses.

VARIETIES OF COCONUT PALMS

KAPA. The nut is gathered when green and husked, the husk put in a native oven and left for two weeks, after which it is taken out and beaten to remove all the dust. The fiber thus obtained is plaited into mats.

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173 425 from the village of Bea. When they reached Bea they found that the report was only too true; Muliki Haamea was indeed dead.

Togalava and his friend then went in search of the murdered chief's body and they found it on the rock, Nukualofa. The murderers, before returning to Hihifo, had arrayed the body in its coronation robes, namely; the beautiful fine mats that the young chief was taking with him and that were to be worn by him when he was to be declared Tui Haamea, and to have his first kava under his new title.

On finding the body Togalava first bathed in the sea, and then sprang on to the rock and took all the mats off the dead body, and handed them to the other young man to carry. Togalava then put the body of the dead chief over his shoulders and carried it back to the village of Haateiho, a distance of about twenty miles, from the rock where they found it. When they got to Haateiho they built a bier on which the dead chief was placed and then brought to the village of Tatakamotoga, Mua, by five strong bearers—a farther distance of eight miles. When they arrived at Tatakamotoga a *tolia* (house in which native chiefs are laid out to await the grave or vault being prepared) was built. This *tolia* was built just under the big *kau* tree on the government reserve at Tatakamotoga. The body was lying in state there while the *lagi*, known as Loamanu, was being built. It took six months to build this *lagi*. When all was ready, the funeral took place.

173 425 764

173 425 After the funeral had taken place the chiefs Maealiuaki and Fatea with Tugi's chiefs [this would be Tugi I, as Tugi II is at present Prince Consort and Premier of Tonga] came to the man Togalava and said to him, "What is the value of the work which you have done for us," and Togalava replied, "Do not trouble," and they replied, "Here is the property of the late Muliki Haamea known as Toutai, and Tatai, also Toutai II. These are yours and to be your successors' properties for ever."

PLANTS USED IN THE TREATMENT OF DISEASE

824 278 **Akataha, Tava, Fekika vao.** For fever, stiffness of the jaws, or fixed eyes in children. The trunks of the three trees are scraped and their juices mixed.

757 **Akau veli.** For bee sting. The plant is rubbed over the affected part.

192 **Bata, Kanume.** For *atuga*. The trunks of the two trees are scraped to obtain the juice, which is used as a drink.

Bolo. For *fefulai* or *kulokula ohu afi*. The leaves are chewed and the juice is painted over the affected parts.

77: Whitcombe Y-3 (no date) 1930 OU9 Tonga OU9

Bolo toga. For elephantiasis (*kulokula*). The leaves are pounded and the juice extracted to make a drink. 278

Bua. For trouble connected with the afterbirth. (See *manonu.*) 757

Ega. For sores on children. Used as a drink. (See *magele.*) 824

Fa, Fala. An emetic. The ends of the young shoots that hang downward are cut off and the juice extracted. 192

Fekika. To induce vomiting. For dysentery (*tuutuutoto*). (See *tava.*)

Fekika vao. For bee sting. (See *akataha.*)

Fiji uli, Hellala. For sore eyes (*tului tuhni oe mata che tevelo;* eye that has been pierced by the devil's finger). The leaves of the two plants are chewed together and the juice dropped into the eyes.

Fiki. For pain in the stomach (*laga oe kete*). The leaves are pounded and the juice extracted.

Fuekula. For constipation. The oil is extracted from the plant.

Gatae. Remedy for stomach pains and for *faka atuga* (one possessed of the evil spirit). The plant is pounded to extract the juice.

Hehea. For boils (*helaakilagi*). The stems or scrapings from the trunk are chewed and painted over the boil. For rheumatism (*feji che tevolo*) and *faka atuga* (one possessed of the evil spirit). (See *nonu.*) For indigestion (*makehekehe*).

Hellala. For boils (*hagatamaki*). For sore eyes. (See *fiji uli.*)

Hiapo kula. For diarrhoea in small children. (See *hogohogo.*)

Hogohogo. For blindness.

Hogohogo, Hiapo kula. For diarrhoea in small children. The roots of the *hiapo kula* and the leaves of the *hogohogo* are used.

Ifi. For infants who are restless in their sleep. The bark of the tree is chewed and juice sprayed over the child's body.
For an injury to the eye. The bark or small branches of the tree are pounded and the juice extracted is then dropped into the eye.
For blindness. The trunk of the *ifi* (horse-chestnut tree) is scraped and beaten to extract the juice.

Jiaine. For the illness of newborn infants. The juice of young green bananas (*jiaine*) is given the child, followed by a warm bath in which are placed *tavahi* leaves. [854]

Kanume. For *atuga.* (See *bata.*)

Kava. For stomach complaint.

Kava inu. For a boil termed *tae moe laatevela* which causes the body, or affected part, to look sunburned. The juice is extracted from the leaves of the drinking kava plant and painted on the affected part.

Kavakava ulie. For elephantiasis (*kulokula*). The leaves are minced and spread with the juice over the affected parts.
For boils which affect the whole body. (See *malolo.*)

Kili milo. Tonic for upset stomach or loss of appetite. (See *leki leki.*)

Lagakali. Remedy for a pain in the side.

Lautolu. For one who has suffered a relapse.

Lautolu, Tono. For *faka atuga.* The leaves from the two trees are pounded together.

Leki leki, Kili milo. Tonic for upset stomach or loss of appetite. The bark of both trees is pounded together and the juice used as a drink.

Lou fuji. For sores of children. (See *magele.*)

Lou lau tolu uta. For *faka atuga.* The leaves are pounded to make the medicine.

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278 757 824 **Magele, Lou fuji, Ega.** For sores on a child. The bark is removed from the roots of the *magele* plant, the *fuji* (banana) leaves are pounded, and the *ega* (turmeric) added; all are mixed with water and given to father, mother, and child to drink.

192 **Malolo.** For a boil termed *matai ika* (fish eye) on the hand or leg. The leaves of the plant are chewed or pounded to a pulp and the juice painted on the boil.

For swelling in the neck (*kia tolo*).

For elephantiasis (*kulokula*). The juice obtained from chewing the leaves is applied to the affected parts.

For stomach pains and for *faka avaga*.

Malolo, Kavakava ulie. For boils which affect the whole body. The leaves from the *malolo* and the young shoots of the *kavakava ulie* are chewed or pounded together and the juice painted over the body.

Mamolo. For fever, stiffness of the jaws, or fixed eyes in children. The trunk is scraped and the juice extracted for a drink.

Manonu. For *faka avaga*. The trunk of the tree is scraped and the juice used as a drink.

[844] For women who are long in labor and can not give quick delivery.

Manonu, Bua. For trouble connected with the afterbirth. Both plants are used.

Mapa. For a boil termed *helaakilagi*. The young shoots of the plants are chewed and juice painted over the boils.

Milo. For *buhi bala*. The trunk is scraped to extract a juice for making children vomit.

Milo i tahi, Tono. For dysentery (*tuutuutoto*). The juice from the two plants is mixed and taken internally.

Mohokoi. For stomach complaint in old people.

Moli. For toothache. The bark is chewed.

Moli toga. For dysentery. (See *tava*.)

Monomono. For upset stomach. The trunk of the tree is scraped and the scrapings pounded with the fruit of the same tree to make a medicine termed *vai bala*.

Moosipo. For injury caused by poisonous fish (*nofu*). The leaves are pounded or chewed and the juice rubbed on the affected parts.

Niu Mea Alava. For *ila* (rash that appears on children). The nut of this tree is husked and the juice obtained from the husk is used as a medicine.

Nonu. For pains in the stomach. The young twigs of the plant are grated or chewed and juice painted over the stomach.

Nonu, Hehea. For rheumatism (*feji ehe tevolo*) and *faka avaga* (one possessed of of the evil spirit). The young leaves of the two plants are gathered and chewed together to make a medicine.

Ovava. For *tabitobito*.

Siale. For *avaga*. The trunk is scraped and the juice extracted.

Sipi. For fits (*teia*). The vine is scraped and the juice extracted.

Tava. For sore mouth in children. The trunk is scraped and the juice extracted to use as an external application.

For fever, stiffness of the jaws, on fixed eyes in children. (See *akataha*.)

Tava, Moli toga, Fekika. For dysentery (*tuutuutoto*). The trunks of these three trees are scraped to procure the juice, which is used as a drink.

Teebileamaul. For stitch in the side, or shortness of breath (*uhuuhu*).

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Toa. An emetic. The trunk of the tree is scraped and the juice extracted from the pulp. 278

The trunk of the tree is scraped and roasted to make *vai fala* (a medicine). 757

Toi. For *faka atua* (one possessed of the evil spirit). The trunk of the tree is scraped to obtain the juice. 824

Tono. For dysentery (*tuutuutoto*). (See *milo i tahi.*) 192

For *faka atua.* (See *lautolu.*)

Toto. For children with fever, stiffness of jaws, or fixed eyes. The trunk of the tree is scraped and pounded to extract the juice for a drink.

Toume. For wounded eyes. The dried sheath of the coconut flower (*toume*) is lighted and held by the native doctor. The patient is told to gaze into a coconut shell filled with sea water until he sees the reflection of the burning *toume* held above. As soon as he sees this reflection the doctor plunges the *toume* into the water and the eye is cured. [755]

Tutu'ull. Tonic or remedy for a relapse in any illness. The leaves are pounded to extract the juice.

Uhl. For boils (*hagatamaki*). This remedy is used for a special type of boil (*mole fua*) which does not come to a head. The plant is mixed with oil and painted on the boil.

For stomach pains (*haga tamaki*), also for toothache and gumboils. The plant is grated or pounded.

WORDS USED IN DESCRIBING THE HUMAN BODY

Ahu: gall.
Aofinima: palm of the hand.
Aofivae: sole of the foot.
Ate: liver.
Atebili: spleen.
Ateivae: calf of the leg.
Avaiihu: nostril.
Bali: pubes.
Bito: navel.
Bule: pit of the stomach.
Bulobulaivae: ankle joint; bottom of the toes.
Ekenaki: voice.
Elelo: tongue.
Faefine: armpit.
Faimanava: stomach.
Fajitua: loins.
Fatafata: breast; chest.
Fatu: abdomen.
Fofoga: head; face (applied to chiefs).
Fogafoga: appearance; head and face.
Fulufulu: hair.
Gaajinima: finger nails.
Gaajivae: toenails.
Gakau: entrails.
Gao: double teeth.
Geejinima: finger nails.
Geejivae: toenails. 826
Gutu: mouth. 192
Halakava: beard.
Hi: semen.
Hiligaumoji: upper lip.
Hilo: anus.
Hiviivae: shin; fore part of the leg.
Huhu: breasts.
Hui: bone.
Huibalalulu: rib bone.
Huifohe: shoulder blades.
Huikouahe: cheek bone.
Ifo: taste.
Ihu: nose.
Jino: body.
Kakano: flesh.
Kalava: vein; blood vessel.
Kanoimata: eyeball.
Kanoimatauli: pupil of the eye.
Kauinima: fingers.
Kauvae: legs and feet.
Kemo: eyebrow.
Kete: belly.
Kia: neck.
Kiaivae: hollow of the leg under the knee.
Kili: skin.
Kofuua: kidneys.

101 square miles. Nuku'alofa, with an approxi-
162 mate population of 15,000, is the largest city in Tonga and the capital (14).

II. A Review of Medical Practices in Tonga

175 A fairly detailed description of medical
114 practices in Tonga is found in *William*
Mariner's Account of the Natives of the
177 *Tonga Islands* (17, pp. 240–273). This account was related to J. Martin by William Mariner, who was shipwrecked somewhere in the archipelago in the early 1800's. The first Europeans to arrive in Tonga were missionaries sent out by the London Missionary Society in 1797.

757 Martin reports that around the year 1800
[759] few plants were used in treating illness. Sickness was thought to originate from an outside force, and all remedies used by the Tongan were reasonably categorized by Martin into three groups: invocation, sacrifice, and external operations. When plant remedies were employed, they had no effect either upon the disease or the patient. Martin states that such remedies were held in "little esteem," for when the reigning king's daughter became seriously ill plant medicines were not considered (17).

752 Martin does refer, however, to the uses
298 of three plants. To reduce opthalmic inflammations, the juice of the *ci* (*Spondias dulcis*) was used. Following circumcision, the end of the penis was wrapped in the leaf of *gnata'i* (*Erythrina* spp.?). And the ulcerated sores of venereal diseases were treated with powder of turmeric from the fleshy rootstock of *Curcuma longa*.

757 Martin states that "the idea of giving
177 (plant) infusions was first taken from the natives of the Fiji Islands." The Tongan
177 also learned the practice of surgery in Fiji, where constant wars afforded great oppor-
752 tunities for practicing this art. The three most important operations then practiced in Tonga were *cawso*, or paracentesis thoracis (drainage of fluid from the chest cavity); *tocolosi*, or an operation to cure tetanus; and *broca*, or castration.

755 Charms and amulets were not employed
[782] in ceremonies for the patient. Sacrifices were common, and horrors such as *tootoo-*

755 782 *nima* and *nawgia*, the cutting off of fingers and the strangling of children, respectively, were frequently employed when a noble lay seriously ill.

757 A story related by Martin gives insight into the attitude of one Tongan man toward disease. During an apparent conflict between a visiting Hawaiian and a Tongan, both of whom had offered to cure Mr. Mariner of "a disordered state of the stomach and bowels attended with headache and drowsiness," the Tongan laughed at the Hawaiian's infusion made of unnamed leaves and roots, which was said to be powerful enough to kill a man if taken in a large dose.

To the Tongan, the idea of curing a sick man by means that would make a healthy man sick was absurd. He offered instead to let some of Mr. Mariner's blood by scarifying his arms and legs with shells.

The Hawaiian, to prove his own faith in the plant decoction, imbibed a dose equal to that prescribed for the sick man. Mr. Mariner followed the example and was well the following morning.

757 278 178 Apparently, then, the use of plants in medicines must have flourished in Tonga sometime after Martin's report in 1817.

Today the use of plants in medicines is vanishing. There are hospitals in each of 743 the main island groups and dispensaries located in several towns. A new hospital with modern surgical facilities is near completion on Tongatapu. There are many 757 278 people, however, who still carry the knowledge and use plant cures, but mainly for treating minor problems.

759 757 One revered practitioner (Uia) refers his patients to the Government Hospital or the Catholic Sisters if they are suffering from what he thinks is a "European" illness. He discerns the origin of a disease by "touching the patient in the body and face" and refrains from treating illnesses that originate outside of Tonga.

757 One woman practitioner was called upon to prepare a remedy for a patient only after the woman—suffering from a serious fungal infection on her hands and arms—had visited the dispensary six times. Ointments given to this patient by the local dispensary proved ineffective. It was learned through Mumui Tatola that the six different

ointments prescribed were of an antibacterial nature. Only an antifungal antibiotic would have worked in this case. After treatment with the plant remedy (a concoction of the leaves of *Solanum uporo*, *Evodia hortensis*, and *Capsicum frutescens*), the patient reported that she was able to sleep, no longer kept awake by pain.

Collocott (7) believes that diagnosis proceeds by a series of trials with different medicines. He reports that one cure after another is tried until one is found that works, or until the patient dies. As in Fiji, different practitioners have their own special cures. For each of them the etiology of a disease is unimportant. What matters is knowing if a certain condition is one they can cure (23). Each practitioner is highly specialized and may treat illnesses associated with only one body system. Some practitioners will treat all illnesses but are specialized in that they treat only children or the aged. I did not encounter any practitioner who diagnosed a complaint through communications with the supernatural world. There is one reference in the literature, however, which indicates that there is some belief in the psychological causation of certain diseases. Churchward's dictionary of the Tongan language defines the word *sausau* as a bundle of leaves buried near a tree and believed to cause sickness to anyone taking fruit from the tree. The word *fula* is defined as a swelling caused by breaking a *tapu* (a cultural restriction), especially by eating a chief's leftover food (6).

Few plants are cultivated specifically for their medicinal value, and many useful species are found growing in villages. Most medicinal plants are collected in "the bush" or near the sea. There do not appear to be any special harvesting techniques and the leaves, bark, and roots are taken from any plant of the required species.

Most medicines are prepared in the form of infusions. Generally, a handful of the required plant part is wrapped in a clean white cloth or the stipule of *Cocos nucifera* and squeezed five or six times in a half coconut shell of fresh water. The resulting filtrate is taken usually once daily until the patient responds to treatment. In all cases where stem or root bark is used, the cork

278 layer, which might contain foreign matter, is removed by scraping. The inner bark is then removed and utilized in medicines.

An important ingredient in many plant remedies is "Tongan oil." This is prepared by pounding together the endocarp of the nuts of *Aleurites moluccana* with the leaves or flowers of *Melastoma denticulatum*, *Decaspermum fruticosum*, *Cinnamonum* spp., and *Coleus amboinicus*. Into the mixture is added the oil of grated coconut flesh, and the intermediate product is allowed to set overnight. The following day the mass is kneaded and pressed against a sheet of corrugated iron, and the "Tongan oil" flows off the sheet into a waiting basin. Fragments of plant parts are strained out through a piece of tapa cloth, and the remaining mixture is left in the sun to evaporate the moisture. The oil is then poured into glass bottles stopped with tapa and stored until
757 ready for use (15). Massaging accompanies most remedies, and the oil is usually used for this massaging.

753 Illnesses have been categorized into three divisions by Collocott (7). One large group is characterized by illnesses thought to be
752 caused by ghosts of deceased relatives. The second group comprises disorders such as broken bones or sprains which are called
753 *fasi* and are usually treated by massage. The third class is composed of skin disorders and include boils, ulcers, rashes, and tumors. Thi class is known in Tonga as *hangatamaki*.

276 Several questions pertaining to folk medicine in Tonga remain unanswered. Why is there no record present or past of the employment of hallucinogenic or narcotic plants by the Tongan in his medical or religious rites? Has there been less need for these agents than in many areas of South America and Asia? Have these Pacific islanders been
137 less inquisitive about their flora? There are several plants used as psychomimetics or narcotics in other parts of the world that are found in Tonga: *Datura stramonium* L. (5), *Capsicum* sp. (26), *Solanum nigrum* L. (21), and a few species contain ergoline alkaloids capable of producing psychomimetic reactions. The plants include *Ipomoea pescaprae* (L.) Sweet, *Argyreia nervosa* (Burm. f.) Bojer, and *Stictocardia tiliifolia* (Des-
000 rou.) Hallier.[2] Barrau (2) reports *Zingiber*

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78: Weiner N-4,5 (1969) 1972
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000 *zerumbet* as one component of an hallucinogenic mixture used in New Guinea.

824 **III. Tongan Plant Nomenclature**

Although Tongans do not seem to categorize plants into botanical orders, they make a distinction between Fungi, Lichenes, Musci, Pteridophyta, and Spermatophyta, and are usually able to recognize small differences between species. Most Tongans, from about age nine, can lead you to a plant given only its local name. However, Tongans are *not* always able to distinguish between similar plants and sometimes use the same name for more than one species. In some cases the same name is applied to several different genera. Table I lists Tongan plant names that are applied to different genera. If Yuncker (32) recorded these names from one or several locals who were unfamiliar with the flora, the list would be of no value. However, assuming that these Tongan names are accurate, I believe that, although Tongan morphological characteristics for distinguishing plants and their relatives may be different from ours, this list may provide insight into the statuses of genera the relationships of which in the plant kingdom are still somewhat enigmatic. For this purpose I have listed also the respective plant families. Plants in Table I with identical Tongan names found in two closely related families deserve closer examination.

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824 The application of similar names to plants within different genera by the Tongan is not always due to carelessness, nor is it evidence that Tongans are unable to categorize plants systematically. The same name is sometimes applied because of common use of more than one species. *Curcuma longa* (Zingiberaceae) is known as *ango*, and *Zingiber zerumbet* (Zingiberaceae) is called *angoango*. These plants obviously belong to different genera, but to the Tongan the fact that the rhizomes of both plants are used in similar medicinal preparations shows a strong enough relationship to indicate similar nomenclature. Similarly, the flowers of both *Cananaga odorata* (Annona-

[278]

[3] Hylin, J. Personal communication to author. February, 1970.

[p. 426-B]

TABLE II

TONGAN NOMENCLATURE: COMPARATIVE MORPHOLOGICAL AND ECONOMIC CHARACTERISTICS

Tongan Name	Scientific Binomial (Family)	Plant Type	Leaf	Flower	Other	Economic Use
fue'aepuaka	1A *Ipomoea congesta*	vine	round-ovate	pale blue, short, pedicellate, funnelform		Leaves used in treating filariasis
"	1B *Pueraria lobata* (Leguminosae)	vine	pinnate, trifoliate	lilac-purple, in axillary clusters	pod	Used in medicines (32)
kihikihi	2A *Oxalis corniculata* (Oxalidaceae)	small herb	palmately compound, 3 leaflets	yellow, umbels	cylindrical capsule	Leaves used to cure convulsions
"	2B *Desmodium triflorum* (Leguminosae)	herb	alternate, primary 3 foliate	purple; 1, 2, or 3	pods	
laufale	3A *Phymatodes scolopendria* (Polypodiaceae)	fern	triangular ovate		sori large on lower surface	Pounded "leaves" used for filariasis and boils
"	3B *Nephrolepis hirsutula* (Aspidiaceae)	fern	serrulate obtuse		sori large, submarginal	
lolic	4A *Catharanthus roseus* (Apocynaceae)	herb	opposite, oblong, apex round	white, pink, in pairs, axillary, salverform		Plant used in medicines (32)
	4B *Nerium oleander* (Apocynaceae)	shrub or small tree	whorled, narrow, oblong	in terminal cymose clusters		
malolo	5A *Glochidion ramiflorum* (Euphorbiaceae)	tree (up to 18 m)	alternate elliptic	small on slender pedicel	fruit grooved	Leaves used in treating food poisoning
"	5B *Glochidion concolor* (Euphorbiaceae)	shrubby tree (up to 8 m)	alternate elliptic	small on pedicel	fruit grooved	Leaves used in medicines (32)

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TABLE II (continued)

Tongan Name	Scientific Binomial (Family)	Plant Type	Leaf	Flower	Other	Economic Use
mangele	6A *Trema amboinensis* (Ulmaceae)	tree (medium size) 7–8 m	alternate oblong-ovate to lanceolate	very small in dense axillary clusters		Leaves used in medicines (32)
"	6B *Trema orientalis* (Ulmaceae)	tree (medium size)	alternate ovate-lanceolate	small in axillary cymes		Leaves used in medicines (32)
mo'osipo	7A *Urena lobata* (Malvaceae)	shrub (1 m)	alternate ovate	on short axillary pedicels, white to pink	fruit with barbed spines	Leaves used to treat burns, scalds. Roots and leaves used to cure diarrhea
"	7B *Triumfetta bartramia* (Tiliaceae)	shrub (2 m)	alternate round-ovate	small in axillary fascicles, yellow	fruit with hooked bristles	
"	7C *Triumfetta procumbens* (Tiliaceae)	prostrate, semi-woody	alternate round-ovate	in axillary umbellate clusters, yellow	fruit with pubescent bristles	
ngatae	8A *Erythrina variegata* (Leguminosae)	small tree	alternate, trifoliate pinnate, triangular-ovate	bright red, numerous in racemose clusters	pod 25 cm long, seeds dark red	Leaves used as cure for convulsions, in treating stomach ache
"	8B *Erythrina crista-galli* (Leguminosae)	tree up to 10 m	alternate, trifoliate	bright red on slender pedicels in racemose clusters		
polo	9A *Capsicum frutescens* (Solanaceae)	shrub (1.5 m)	alternate, ovate-lanceolate	white, small axillary pedicels	fruit ovoid, 2.5 cm, bright red	Frequently used in many remedies

TABLE II (continued)

Tongan Name	Scientific Binomial (Family)	Plant Type	Leaf	Flower	Other	Economic Use
polo (cont.)	9B *Ricina humilis* (Phytolaccaceae)	shrub (1 m)	alternate, ovate-lanceolate	white or greenish, on slender pedicels in terminal and axillary racemose	fruit red fleshy	Red juice of fruit used as a dye (32)
tamanu	10A *Calophyllum inophyllum* (Guttiferae)	tree	opposite, oval, subovate	white, in axillary racemose clusters	fruit globose 3–4 cm in diam, one-seeded	Oil from seeds is used in treating rheumatism (4)
"	10B *Calophyllum vitiense* (Guttiferae)	tree	opposite, oblong-elliptic	pink, axillary racemose clusters	fruit sub-globose 2 cm in diam	Timber is used for building purposes (32)
te'ekosi	11A *Ageratum conyzoides* (Compositae) (see Asteraceae)	herb	opposite, ovate	blue, in terminal and axillary clusters	pappus of 5 awned scales	Leaves applied to infected wounds
"	11B *Cassia tora* (Leguminosae)	woody plant (1 m)	alternate, oval	yellow, in axillary pairs	pods slender	
"	11C *Malvastrum coromandelianum* (Malvaceae)	shrub (1 m)	alternate, ovate	salmon yellow, in axillary and terminal clusters		
"	11D *Sida samoensis* (Malvaceae)	herb	alternate, oval	solitary on slender axillary pedicels		

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TABLE II (continued)

Tongan Name	Scientific Binomial (Family)	Plant Type	Leaf	Flower	Other	Economic Use
"	11E *Salvia coccinea* (Labiatae)	herb (60 cm)	opposite, ovate, acute, or obtuse	bright red or pink		
tono	12A *Centella asiatica* (Umbelliferae)	herb	clustered at nodes, orbicular ovate	white or pink, very small, scant in axillary umbels	fruit round, compressed, ribbed	Leaves used as poultices (32), in tonics, and for treating convulsions
"	12B *Carinta herbacea* (Rubiaceae)	herb	opposite, rounded, cordate	white, small scant in axillary umbels	fleshy, red	Leaves are used in medicines (32)
volovalo	13A *Premna taitensis* var. *rimatarensis* (Verbenaceae)	shrub or small tree	opposite, ovate, acute, or obtuse	greenish white, small, in terminal puberulent panicles	fruit globose (6 mm diam)	Bark is used in tonics
"	13B *Premna obtusifolia* (Verbenaceae)	shrub or small tree	opposite, oblong-ovate	greenish white, small, in terminal branching clusters	fruit globose (3 mm diam)	

78: Weiner N-4,5 (1969) 1972
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Further reassurance regarding the consistency of plant names came while I was drying plant material later to be used as crude drug samples. As individual trays of desiccated leaves and bark were removed from copra driers, Tongan workers who had inquisitively gathered would attempt to call out the identity of the dried contents before the attached identifications were exposed. Most men were able to identify the plant names correctly, relying solely on their ability to interpret the scents and shapes of the desiccated samples.

V. Enumeration of Tongan Medicinal Plants

Specimens of 59 species of plants were collected on Tongatapu Island. The plants were identified by using Yuncker (32) and also by a study of specimens available at the Herbarium of the Bishop Museum. Final determinations were established by Dr. A. C. Smith of the University of Hawaii. Voucher specimens are on deposit at the Bishop Museum.

Following is an enumeration of plants utilized as medicines by the Tongan people. This list includes my own observations as well as those reported in the literature. Families, genera, and species are arranged alphabetically. Tongan vernacular names and geographical distributions of each species, as given by Yuncker (32), are included. The medicinal applications of each species in some other regions of the Pacific are enumerated to show their popularity in use.

AMARANTHACEAE
(Amaranth Family)

ACHYRANTHES ASPERA L.

tamatama

This pantropical species is common throughout the archipelago.

In Tahiti the roots are used in treating mouth sores, toothache, and syphilitic sores (19). It is reported that the plant is employed in medicines in Niue (31). In the Philippines the leaves and roots are valued as diuretics and the sap for treating cataracts (21).

In Tonga the leaves are used to tie wounds after circumcision (32), and after

278 being chewed are applied to serious wounds.
[752] The sap from leaves heated over a fire is
[757] valued in treating tetanus.

ANACARDIACEAE
(Mango Family)

278 137 RHUS TAITENSIS Guill.
tavahi

This tree is found throughout Tonga and ranges from the Philippines to Polynesia.

278 [171] In Tahiti the plant is used as an anti-diarrheic but is considered a dangerous medicine (19).

In Tonga it is reported that the leaves are employed in medicines (32).

278 137 SPONDIAS DULCIS Parkinson
vi

This tree, occasional in Tongan villages, is a native of Malaysia. It is an aboriginal introduction to Polynesia.

278 171 In Tahiti parts of the plant are made into a fermented drink that is valued as an anti-diarrheic (19). In the Philippines it is reported that the fruit is used in treating dysentery (21).

278 757 An extract of the bark is considered efficacious in treating diarrhea in Tonga.

ANNONACEAE
(Custard-Apple Family)

278 137 ANNONA MURICATA L.
apele

Originally from tropical America but now cultivated in many tropical countries, this small tree is occasional in Tongan villages.

278 [171] In the Philippines the ripe fruit is thought to have antiscorbutic properties and the unripe fruit is employed in treating dysentery (21).

[757] In Tonga the leaves, pounded and prepared in an infusion, are utilized in treating stomach problems.

278 137 CANANGA ODORATA (Lam.) Hook. f. & Thoms.
mohokoi

This species, originally from southern Asia, is cultivated throughout Tonga.

Species of *Cananga* from the Yalu region in New Guinea are said to contain alkaloids (30).

[p. 436-B]

A [Cf Achyr thes aspera L.--
A Analyst.]

78: Weiner N-4,5 (1969) 1972
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278 In Tonga an infusion of the bark is used
757 for stomach problems, while a remedy composed of the leaves is given to infants suffering from diarrhea. A concoction containing the leaves is taken in cases of severe boils.

278 **APOCYNACEAE**
137 **(Periwinkle Family)**

CATHARANTHUS ROSEUS (L.) G. Don.
lolie, valeti

This small herb is a frequent ornamental throughout Tonga. Native to Madagascar, its distribution is now worldwide. See Wm. Stearns, Lloydia 29(3).

278 In the Philippines a leaf decoction is used
171 in treating diabetes, while a decoction of the roots is considered an emmenagogue. In South Africa a proprietary medicine called "Covinca" prepared from this plant is employed as a specific for diabetes (21).

278 It is reported that the plant is valued in medicine in Tonga (32).

278 ERVATAMIA ORIENTALIS (R. Brown) Turrill
te'ete'emanu

137 This species is occasional in Tonga and is distributed from Fiji to Samoa and the Society Islands.

A species of *Ervatamia* from the Yalu and Laloki regions of New Guinea contains alkaloids (30).

278 In Tonga the root is grated and an in-
757 fusion made for treating toothache. The mouthwash is said to be an effective agent in relieving pain. Koch (15) reports that this treatment is often replaced by chewing tobacco (*Nicotiana tabacum* L.).

278 **ASCLEPIADACEAE**
137 **(Milkweed Family)**

HOYA AUSTRALIS R. Br.
matolu

This vine is frequently encountered in forested areas throughout Tonga. It is distributed from Polynesia and Fiji to the New Hebrides and Australia.

278 *Hoya australis* is used in many countries
171 for treating wounds (21).

[p.437-A]

278 757 In Tonga the leaves are pounded and dipped in water to make a lotion for treating rashes.

CASUARINACEAE
(Casuarina Family)

278 137 CASUARINA EQUISETIFOLIA L.

toa

This tall tree is found occasionally throughout the archipelago. Thought to be native to Indo-Malaysia and Polynesia, it is now widely cultivated in most tropical countries.

278 171 In Tahiti an infusion of the bark is taken for nervous disorders (19). In Niue it is reported that the fruit is used in medicine (31). In the Philippines an infusion of the branches is said to be diuretic, while a decoction of the bark, which contains 18% tannin (21), is employed as an emmenagogue.

278 757 An infusion of the bark of the *toa* tree is taken in Tonga for coughs, ulcers, stomach ache, and constipation.

COMBRETACEAE
(Terminalia Family)

278 137 TERMINALIA CATAPPA L.

telie

Frequent throughout the archipelago, this species is distributed from tropical Asia to Polynesia and is naturalized in America.

A species of *Terminalia* from the Popondetta region of New Guinea contains saponins (30). 278 171 In Niue a preparation made from the bark of *T. catappa* is used in treating mouth sores in children (thrush?) (31). In the Philippines the red leaves are valued as a vermifuge, the fruit as a purgative, and the leaves, mixed with oil, are said to relieve pains of the breast. It is further reported that a preparation of the bark is utilized against gastric fevers and as an antidysenteric. The tender leaves have been cooked with oil from the fruit and employed in the treatment of leprosy (21).

278 757 In Tonga the bark and young leaves are pounded together and the juices applied to sores about the tongue and gums. An infusion of the bark is sometimes used in treating stomach ache.

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278
137

COMPOSITAE
(Composite Family)

AGERATUM CONYZOIDES L.

te'ekosi

This herb is common throughout Tonga. Native to South America, it is now distributed pantropically.

278
171

In the Philippines the leaves are pounded and mixed with salt, the preparation being valued as a vulnerary. The leaves are also cooked in coconut oil and applied to wounds. The plant is used widely in other countries (21).

278
752

In Tonga the leaves are pounded and the juices applied to infected wounds.

BIDENS PILOSA L.

278

fisi'uli

137

This plant, found throughout Tonga, is distributed widely in tropical countries.

278
171

In the Philippines flowers of this species are mixed with balls of boiled rice and set to ferment in the manufacture of crude spirits. Usage is reported from Brazil, Mexico, Malaya, Indo-China, and Africa. The leaves are official in the Dutch and Mexican Pharmacopoeias (21).

278
757

In Tonga an infusion of the leaves is valued in treating stomach problems and in cases of food poisoning.

WEDELIA BIFLORA (L.) DC.

278

ate

137

This shrub is found along rocky coasts throughout Tonga. It is distributed from Malaya and southern Asia to Polynesia.

278
[171]

In the Philippines a decoction of the fresh roots is considered to be diuretic and to act as an emmenagogue. Other usage is reported (21).

[752]
[757]

In Tonga the leaves are pounded between two stones which have been preheated in a fire and the juices applied to serious wounds. Koch (15) reports that this remedy is resorted to in cases of tetanus.

278
137

CONVOLVULACEAE
(Morning-Glory Family)

IPOMOEA CONGESTA R. Br.

fue'acpuaka

This vine, frequent in Tonga, is distributed from Formosa to tropical Australia and Polynesia.

[p. 438-A]

278 757 In Tonga the leaves are crushed and squeezed through a cloth into a cup of water to prepare a drink for treating filariasis. In a similar preparation the roots are cut into small pieces and the resulting drink is taken as an apperient.

278 137 **EBENACEAE**
(Ebony Family)

DIOSPYROS FERREA (Willdenow) Bakhuizen
kanume

This tree is found throughout Tonga and is distributed from India and Ceylon eastward to Hawaii.

A species of *Diospyros* from the Wau region of New Guinea is reported to contain steroids (30). In the Philippines the bark and leaves of *D. ebenaster* Retz. are made into a blistering plaster (21).

278 [171]

Yuncker (32) reports that in Tonga the bark is used in preparing medicines

278 137 **EUPHORBIACEAE**
(Spurge Family)

GLOCHIDION RAMIFLORUM J. R. & G. Forst.
malolo

This large tree, frequent in Tonga, is found from the New Hebrides to Samoa.

A species of *Glochidion* from the Lae Wau, and Nondugl regions of New Guinea is reported to contain saponins (30).

278 757 From the leaves of this plant the Tongans make a remedy for food poisoning. The pounded leaves are frequently applied to boils and a drink prepared from young leaves has been employed in cases where infants were suffering from a "furry tongue accompanied by a sleeping fit."

278 137 JATROPHA CURCAS L.
fiki

This species is frequent throughout Tonga and is distributed pantropically.

278 171 In Samoa (12) the juice of this plant is thought to be effective for treating yaws. In the Philippines the plant has many uses, the oil from the seeds is the basis of a violet purgative, a decoction of the leaves is valued as an antidiarrheic and as a cough medicine, and the bark is pounded and applied to wounds originating from animal bites. Quisumbing (21) reports usage in other coun-

[p. 438-B]

278 tries and states that the leaves are official
[171] in the Mexican and French Pharmacopoeias.
A drink made from the pounded leaves is
[757] employed in Tonga as a cure for stomach
ache.

278 MACARANGA HAHVEYANA (Muell. Arg.)
Muell. Arg.
137 *loupata*

This small tree is found in Tonga, Fiji, Niue, Samoa, and the Society Islands.

278 In Tonga a drink made from the root bark
(cambium layer) is utilized in treating
757 hemorrhoids after pregnancy. A drink from
the boiled bark finds a role in treating constipation. Yuncker reports (32) that the leaves are used for treating stomach ailments of infants.

278 RICINUS COMMUNIS L.
lepohina
137

The castor bean plant is found in waste areas throughout Tonga and is distributed pantropically.

The seeds of this plant are the source of castor oil but they also contain a highly
278 poisonous substance named ricin. In Samoa
it is reported that the oil is employed as a
171 laxative (12). In the Philippines fresh leaves are applied externally for headache and the leaves, cooked with milk, are used in poultices for ulcers. Wide usage is recorded by Quisumbing (21), who states also that the leaves and seeds are official in many pharmacopoeias.

278 In Tonga the juices from pounded bark
are applied in cases of skin rashes. A drink
757 made from the pounded bark is taken for
tumors of the breast and for boils as well.

278 **GOODENIACEAE**
(Naupaka Family)

137 *SCAEVOLA TACCADA (Mill.) Krause,
probably var. *taccada*
ngahu

This shrub, common throughout Tonga, is found also from India to Australia and is widely distributed on Pacific islands.

278 In Fiji a decoction of the roots is used for
stomach ache (20). In the Philippines juices
171 from the ripe fruit are applied locally to

* Specimen lost.

[p. 439-A]

78: Weiner N-4,5 (1969) 1972
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278 cataracts, the roots are employed in com-
171 batting beriberi, syphilitic infections, and dysentery. The leaves of this plant are smoked like tobacco. Usage in other countries is reported (21).

278 In Tonga the bark is pounded and the juices applied in treating ringworm.

757

GUTTIFERAE

(Mangosteen Family)

278 CALOPHYLLUM INOPHYLLUM L.

137 *feta'u, tamanu*

This species occurs frequently near the sea in Tonga. It is distributed from eastern Africa and India through Malaya and Polynesia.

278 The oil extracted from the seeds is used
171 in Samoa in treating rheumatism (12). Quisumbing (21) reports that it is poisonous and that the Samoans use parts of the plant in preparing an arrow poison. In New Caledonia the sap is applied to wounds, and oil from the seeds enters into the preparation of a digestive aid (19). Natives of the Philippines value the oil from the seeds and leaves in treating eye disorders; the oleoresin is applied to wounds, and an infusion of the leaves to hemorrhoids. Oleoresin from this species is official in the Mexican and Spanish Pharmacopoeias (21).

278 In Tonga the oil is a well-known remedy
757 for rheumatism (4).

GARCINIA SESSILIS (Forst. f.) Seem.

278 *heilala*

137 This tree, occasional in Tonga, occurs also in Fiji and Samoa.

In New Guinea a species of *Garcinia* from the Zenag, Nondugl, and Popondetta regions contains saponins and other steroids (30).

278 In the Philippines the leaves and bark of
171 *G. mangostana* L. enter into astringent and febrifuge preparations. The pericarp is used in curing chronic intestinal catarrh (21).

278 In Tonga this plant is frequently em-
757 ployed medicinally. The leaves are squeezed in water and applied to skin rashes; a decoction of young leaves is considered helpful for stomach ache in children or for infants suffering from a "sleeping fit." When it is
[828 believed that ghosts have caused hallucina-
775] tions in a patient an infusion of the leaves is prepared ar administered.

[P439-B]

278 757 is prepared and administered. The leaves are commonly used for infected eyes (conjunctivitis): they are chewed and squeezed through tapa cloth into the affected organ. This use is also reported by Koch (15).

278 137 **HERNANDIACEAE**
(Hernandia Family)

GYROCARPUS AMERICANUS Jacq. ssp. *americanus*
pukovili

This tree, occasional in Tonga, is distributed pantropically.

278 757 Yuncker (32) reports that in Tonga the leaves and bark are esteemed medicinally. A drink made from the bark is taken for edema following childbirth and in treating stomach ache. Koch (15) reports that a similar preparation is used in cases of filariasis.

278 137 HERNANDIA MOERENHOUTIANA Guill. ssp. *campanulata* Kubitzki
pipi, pipitui

This large tree occurs throughout the archipelago and is found from the Society Islands to Fiji.

278 171 Yuncker reports that in Niue the flowers are used medicinally (32). In the Philippines the oil from *H. ovigera* L. is employed as a hair restorer and for dandruff (21).

278 757 In Tonga the leaves, bark, and flowers are pounded together and applied to boils.

278 **LEGUMINOSAE**
(Bean Family)

137 CALOPOGONIUM MUCUNOIDES Desv.
fuekala

This species is found occasionally in villages throughout Tonga.

278 757 The leaves are used rarely as a cure for filariasis in Tonga.

278 137 ERYTHRINA VARIEGATA L. var. *orientalis* (L.) Merr.
ngatae

This small tree is frequent throughout Tonga and occurs from India to Polynesia.

278 171 In Niue the bark and small twigs are used in medicine (31). The roots and the leaves are employed in the Philippines as a feb-

78: Weiner N-4,5 (1969) 1972
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278 rifuge and it is reported that the bark is a
[171] depressant (8).

In Tonga the leaves are pounded and squeezed through a piece of tapa cloth into
278 a bowl of cold water. One teaspoonful of
757 the resulting filtrate is taken to cure convulsions in infants. The drink is sometimes resorted to for stomach ache (15).

278 INOCARPUS EDULIS J. R. & G. Forst.
137 *ifi*

This plant is found throughout Tonga and occurs from Malaysia to Polynesia.

278 In Tahiti the pounded bark is applied to
137 bites of poisonous fish (19). In Niue the leaves of *I. fagiferus* are used in medicines (31).

278 Koch (15) reports that in Tonga the bark
757 is valued in treating diarrhea in children.

278 PUERARIA LOBATA (Willd.) Ohwi
fue'aepuaka, aka
137 This vine, frequent in Tonga, ranges from Asia and Malaya to Polynesia.

278 According to Yuncker *P. lobata* is used medicinally (32).

278 VIGNA MARINA (Burm.) Merr.
lautolu tahi
137 This long-trailing pantropical vine is common on beaches in Tonga.

278 A drink prepared by squeezing the young
757 leaves through a piece of cloth into a bowl of water is taken in Tonga to cure "sleeping fits" in infants. The crushed leaves are applied to boils, and steam which originates from the leaves when they are placed in a basin of boiling water is inhaled to cure
[753] fever and headache. Aches believed to be
[775] caused by ghosts of deceased relatives are treated by applying the crushed leaves to the affected part of the body.

278 **LILIACEAE**
137 **(Lily Family)**

CORDYLINE TERMINALIS (L.) Kunth.
si

This plant is found throughout Tonga and is widely distributed in Polynesia.

278 A species of *Cordyline* is used widely in
[171] the Pacific (21).

In Tonga the leaves of *C. terminalis* are
[757]

[p.440-B]

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278 757 squeezed into well-water and the liquid is used to cure eye infections. The ripe leaves are crushed in combination with Tongan oil and applied to abscesses of the gums.

LOGANIACEAE
(Strychnine Family)

278 137 GENIOSTOMA INSULARE A. C. Sm. & Stone var. *insulare* f. *insulare*

te'epilo'ānaul

This species is native to Tonga and Fiji.

278 [171] [757] Hunt (12) reports that members of this genus are used medicinally in Samoa. A drink prepared from the bark of *G. insulare* is valued in Tonga in treating constipation.

LORANTHACEAE
278 137 (Mistletoe Family)

AMYLOTHECA INSULARUM (Gray) Danser

kainikavea, topu'uno

This species is found growing on tree branches in forests throughout Tonga. It is found also in Fiji, Samoa, and the Society Islands.

278 The leaves are used in medicine (32).

MALVACEAE
278 (Hibiscus Family)

137 HIBISCUS TILIACEUS L.

fau

This plant is frequent in Tonga and is distributed pantropically.

278 171 In Tahiti *H. tiliaceus* is reported to be an emmenagogue; its flowers are emollient (19). In Niue the flowers are used medicinally (31).

278 757 In Tonga the bark and young leaves are utilized in treating skin disorders (32). The leaves are chewed and then applied while the bark is pounded, water added, and the solution squeezed through a piece of tapa cloth onto the affected area.

278 137 THESPESIA POPULNEA (L.) Soland. ex Correa

milo

This pantropical tree is a frequent shore plant in Tonga.

278 171 An extract of the fruit is used in Niue as a purge and is applied to swollen testicles (31). In Tahiti a preparation of the green

278 capsules is employed to alleviate migraine
171 headache, and the yellow latex is applied to insect bites (19). In the Philippines a decoction of the leaves is considered a cure for itches. Other economic applications are reported (21).

278 A drink prepared from the ripe leaves and
757 bark is given in Tonga to teething children
856 who run a fever and have an excessive saliva flow.

278 URENA LOBATA L.

mo'osipo

137 This common pantropical weed occurs in Tonga.

278 In Samoa the leaves are applied locally in
171 filarial swellings (12). The plant is used in Tahiti as an emmenagogue (19). In the Philippines a decoction of the root is valued for colic, the boiled leaves are applied as a poultice in inflammations of the intestines and bladder, and a decoction of the roots and leaves valued as an emollient (21).

278 In Tonga the leaves are squeezed by hand
[752] and poulticed to burns and scalds. An in-
[757] fusion of the roots and leaves is considered a cure for diarrhea.

MELIACEAE
(Mahogany Family)

278
137 AGLAIA SALTATORUM A. C. Sm.

langakali

This shrub is found throughout Tonga and in Fiji and Niue.

278 In the Philippines a decoction of the roots
[171] and leaves of *A. odorata* Lour. is esteemed as a tonic (21).

In Tonga the bark is employed in medicine.

278 DYSOXYLUM FORSTERI (Juss.) C. DC.

137 *mo'ota*

This tree is endemic throughout Tonga.

Species of *Dysoxylum* from several regions of New Guinea proved positive in tests
278 for saponins and other steroids (30). In the
171 Philippines a decoction of the juice of the fresh bark of *D. decandrum* is used for coughs (21).

278 The steam from the leaves of this plant
(when pressed in a basin of boiling water)
757 is inhaled in Tonga to cure headache and reduce fever.

[p. 441-B]

278 137 XYLOCARPUS GRANATUM Koenig
lekileki

This tree is found near mangrove swamps in Tonga and is distributed from India and Ceylon through Malaysia and Polynesia.

278 171 The bark is said to be astringent and a decoction of the fruit and seeds is used in the Philippines as an antidiarrheic (21).

278 757 In Tonga the bark is crushed and boiled in water. One tablespoonful taken three times a day is prescribed for any type of high fever, but especially for fever accompanied by a "black, furry tongue."

278 137 **MORACEAE**
(Fig Family)

ARTOCARPUS ALTILIS (Parkinson) Fosberg
mei

The breadfruit tree is cultivated throughout the Pacific Islands and in parts of the New World.

278 171 In Fiji an infusion of the root-bark is utilized in the treatment of internal fractures.

278 757 In Tonga an infusion of the bark is used in cases of relapsed illness. Boils are treated with the white gum which exudes when the steam is incised. The boil is then covered with a piece of tapa that has been soaked in Tongan oil. The dressing is changed daily, and the boil washed with sea water until a cure is effected.

278 137 FICUS OBLIQUA Forst. f.
'ovava

This large tree is frequent throughout Tonga, Samoa, and westward to the New Hebrides.

278 757 An infusion of the leaves is used in Tonga to treat convulsions in infants. An infusion of the pounded bark is employed for treating boils or tumors of the breast. Koch (15) reports that the yellow leaves are chewed and applied to boils.

278 137 **MYRTACEAE**
(Myrtle Family)

PSIDIUM GUAJAVA L.
kuava

This tropical American tree is rather common in the Pacific Islands.

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278 XYLOCARPUS GRANATUM Koenig
137 *lokileki*

This tree is found near mangrove swamps in Tonga and is distributed from India and Ceylon through Malaysia and Polynesia.

278 The bark is said to be astringent and a
171 decoction of the fruit and seeds is used in the Philippines as an antidiarrheic (21).

In Tonga the bark is crushed and boiled
278 in water. One tablespoonful taken three
757 times a day is prescribed for any type of high fever, but especially for fever accompanied by a "black, furry tongue."

278 **MORACEAE**
137 **(Fig Family)**

ARTOCARPUS ALTILIS (Parkinson) Fosberg
mei

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171 utilized in the treatment of internal fractures.

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278 in cases of relapsed illness. Boils are treated
757 with the white gum which exudes when the steam is incised. The boil is then covered with a piece of tapa that has been soaked in Tongan oil. The dressing is changed daily, and the boil washed with sea water until a cure is effected.

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137 *'ovava*

This large tree is frequent throughout Tonga, Samoa, and westward to the New Hebrides.

278 An infusion of the leaves is used in Tonga
757 to treat convulsions in infants. An infusion of the pounded bark is employed for treating boils or tumors of the breast. Koch (15) reports that the yellow leaves are chewed and applied to boils.

278 **MYRTACEAE**
137 **(Myrtle Family)**

PSIDIUM GUAJAVA L.
kuava

This tropical American tree is rather common in the Pacific Islands.

[p. 442-A]

278 171 Papy (19) reports that this plant enters into the preparation of an astringent in Tahiti. In Niue the leaves are considered "ghost medicine" (31). In the Philippines the leaves, bark, and roots are employed in decoction for washing wounds and ulcers. The bark and leaves reportedly are astringent and antidiarrheic in decoction. Wide usage in other countries is reported by Quisumbing (21) who states that the roots are official in the Mexican Pharmacopoeia and the leaves official in the Dutch and Mexican Pharmacopoeias.

278 757 In Tonga the juice of chewed leaves is swallowed as a treatment for stomach ache.

SYZYGIUM CORYNOCARPUM (A. Gray) C. Muell.

278 137 *hehea*

This small tree is occasional in Tonga and occurs also in Fiji and Samoa.

278 757 In Tonga the bark represents one component of a general tonic but more importantly the chewed leaves appear to be employed frequently as a topical treatment for tumors of the breast. This species merits detailed chemical and pharmacological analysis. (See VII, Discussion.)A

278 137 SYZYGIUM MALACCENSE (L.) Merr. & Perry

fekika kai

The mountain apple tree, a native of India and Malaya, is found on many Pacific islands.

278 171 In Tahiti the leaves are utilized in treating bronchitis, and the bark is considered tonic and astringent (19). The bark is used in Niue in treating mouth sores in children (31). An infusion of the bark is taken in Fiji as a cure for the "flu." Quisumbing (21) reports wide usage of this plant in other countries (as a diuretic, for dysentery, as a mouthwash for thrush, etc.).

278 757 In Tonga, the bark is valued as a general tonic, and an infusion of the bark is taken for coughs (15) and to relieve constipation.

NYCTAGINACEAE
(Four O'Clock Family)

278 137 PISONIA GRANDIS R. Br.

pukovai

This tree is occasionally found in Tonga. It is distributed from the Moluccas through

[p. 442-B]

A[See Category 278, p. 449-B—
^ Analyst.]

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278 Borneo, Australia, the Marianas, the Philippines, and Polynesia.
[171] A drink made from an infusion of the
[757] bark is taken in Tonga to treat *fefi'aloto*, a term which I am not able to translate.

278 **OLEACEAE**
(Olive Family)

137 JASMINIUM SIMPLICIFOLIUM Forst. f.
tutu'uli

This vine, occasional in Tonga, is found in Australia, the Solomon Islands, the New Hebrides, Fiji, and Polynesia.
278 Quisumbing (21) reports wide usage of
171 this genus in other countries.
In Tonga an infusion of the pounded
278 leaves is valued in treating cases of relapsed
757 illness; an infusion of the bark provides a treatment for jaundice ("person yellow") and for ulcers. Koch (15) reports that the leaves are utilized to cure headaches: the left or right side of the leaf is chosen, according to which side of the head is aching, and then six of them are chewed inside a piece of fresh tapa cloth until the juices mixed with saliva flow freely. This liquid is then dripped into both eyes and nostrils. This kind of preparation is rare.

278 **OXALIDACEAE**
(Wood Sorrel Family)

137 OXALIS CORNICULATA L.
kihikihi

This small pantropical herb is common throughout Tonga.
278 In the Philippines the leaves are con-
171 sidered antiscorbutic and the juice of the leaves is used for cleaning wounds and for itches. A decoction of the leaves is taken for fevers and dysentery. It is also reported by Quisumbing (21) that the fresh juice of the leaves relieves *Datura* intoxication.
278 An infusion of the leaves is used in Tonga
757 to cure convulsions in infants.

278 **PIPERACEAE**
(Pepper Family)

137 PIPER METHYSTICUM Forst. f.
kava
276 This shrub is found in most Tongan vil-

278 137 lages and is distributed widely throughout the Pacific Islands.

276 In Samoa (12) the root is used in treating gonorrhea. In New Caledonia the leaves 278 are chewed to cure bronchitis, and in New 171 Guinea the plant is taken as a tonic and soporific and is said to be valuable in treating gonorrhea and inflammations of the uterus (3). In Fiji the roots are pulverized and a drink prepared which has sedative [276] properties. The employment of the roots in making a drink is widespread in Tonga and other Pacific Islands; detailed chemical and pharmacological analysis has been undertaken and is reviewed by Keller and Klohs (13).

278 757 In Tonga, the yellow leaves are sometimes pounded and an infusion used to soothe crying infants.

278 137 PIPER PUBERULUM (Benth.) Benth. var. GLABRUM (C. DC.) A. C. Sm.
kavakava'uli

This variety is very common in Tonga and occurs also in Fiji and Samoa.

278 171 In Fiji the leaves are chewed until moist and applied to wounds.

278 757 In Tonga the inner bark is boiled and the resulting liquid drunk in cases of filariasis and other inflammations. Boils are commonly treated by application of the pounded leaves.

278 137 **POLYPODIACEAE**
(Common Fern Family)

PHYMATODES SCOLOPENDRIA (Burm.) Ching
laufale

This fern is common in plantations and waste areas throughout the archipelago. It is found also in Africa, Australia, Ceylon, southern China, Madagascar, Malaysia, and New Zealand.

278 137 The smoke given off when this plant is heated over a fire is inhaled in regions of New Guinea to relieve catarrh (27). In Niue the leaves are used medicinally (31).

278 757 In Tonga an infusion of the pounded leaves or bark is prescribed for infants suffering from filariasis. It is considered a promising sign if this brings out a rash. The pounded leaves are also applied to boils.

[p. 443-B]

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278
137

RHAMNACEAE
(Buckthorn Family)

ALPHITONIA ZIZYPHOIDES (Spreng.) A. Gray

toi

This large tree is frequent in Tonga and is distributed also from Sumatra and the Philippines eastward to Polynesia.

278 In Tahiti the bark enters into lotions for treating eczema (19).

[171] In Tonga the liquid derived from the [757] boiled bark is drunk in cases of constipation, for coughs, headache, and menstrual pain.

[841]

RUBIACEAE
(Coffee Family)

278
137 CARINTA HERBACEA (Jacq.) W. F. Wight, ex Saff.

tono

This pantropical species is occasional in Tonga.

278 In Tonga the leaves are crushed, placed in a cloth, and then squeezed in a small
846 quantity of water. The wet cloth is sucked by newly born infants. The liquid is thought to help make the meconium pass.

278 GARDENIA TAITENSIS DC.

siale

137 Frequently planted in Tonga for its flowers, this species occurs also in Fiji and throughout Polynesia.

278 In Tahiti an infusion of the flowers is taken as a remedy for migraine headache
171 (19). In Niue the root-bark is considered a treatment for headache (31), while in the Philippines the fruits of *G. pseudopsidium* (Blanco) Vill. are used against smallpox (8).

278 In Tonga an infusion of the bark mixed with sugar and lime juice is employed to
757 relieve nausea, headache, and weakness in [843] pregnancy. A plain infusion of the bark is valued as a cure for hallucinations thought [775] to be caused by the ghost of a deceased [828] relative.

GUETTARDA SPECIOSA L.

278 *puopua*

137 This tree is commonly found near the shore in Tonga, and is widely distributed throughout Polynesia.

[p. 444-A]

78: Weiner N-4,5 (1969) 1972
OU9 Tonga OU9

278 171 In Tahiti this species has antidiarrhetic, febrifugal, and anticholinergic applications (19).

278 757 An infusion of the inner bark prepared with boiling water is esteemed in Tonga as a treatment for epilepsy.

278 137 MORINDA CITRIFOLIA L.

nonu

The Indian mulberry is common in thickets throughout Tonga and is distributed from India eastward to Polynesia.

278 171 In Fiji the fruit is valuable in treating kidney problems (20). In Niue, Yuncker (31) reports that the bark, leaves, and flowers are used in medicines. In the Philippines the fruit is used as an emmenagogue, the sap of the leaves as an antidiarrheic, and the fresh leaves are applied to external ulcers (21). In Samoa the leaves are employed to cure rheumatism and in cases of filarial swellings (12).

278 757 This is one of the most commonly used cures for diarrhea in infants; the crushed leaves moistened in water are applied to aching joints or massaged into aching muscles; the fruits are crushed and the juice dripped onto aching teeth or sore gums; and the leaves enter into general tonics.

278 137 TABERNA SAMBUCINA (Forst. f.) Durand

manonu

This species is frequent in Tonga and is found from Micronesia and New Caledonia eastward to the Tuamotu Archipelago.

278 171 In Niue a liniment is made from the fruit (31), while in Fiji this species is considered a good treatment for rheumatism and swelling of the groin (20).

278 757 A drink prepared from the boiled bark is taken in Tonga to relieve constipation and as a general tonic.

278 137 **RUTACEAE**
(Rue Family)

EUODIA HORTENSIS J. R. & G. Forst. f. SIMPLICIFOLIA (Rechinger) K. Schum. ex Lauterb.

uhi

This variety is occasional in Tonga and is widely distributed in the Pacific Islands.

[p. 444-B]

78: Weiner N-4,5 (1969) 1972
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278 171 Species of *Evodia* from several regions of New Guinea contain alkaloids (30). In Fiji an infusion of the bark is used as an emmenagogue, while in Niue the leaves are chewed to relieve toothache and stomachache (31).

278 757 An infusion of the leaves is taken in Tonga as a laxative and to reduce fevers. Crushed leaves mixed with Tongan oil are applied to sores of the gum, and Koch (15) reports that the leaves are massaged on aching heads and employed to cure earache.

SAPINDACEAE
(Soapberry Family)

278 137 POMETIA PINNATA J. R. & G. Forst.

tava

This large tree is occasional in Tonga and is found in Malaya, New Guinea, and Polynesia.

278 171 In Fiji an infusion of the bark is taken as a diuretic. Species of *Pometia* from the Yalu and Popondetta regions of New Guinea contain saponins and other steroids (30).

278 757 Koch (15) reports that in Tonga an infusion of the bark is used to cure diarrhea in children, while Yuncker (32) states that the bark is utilized in treating "stomach troubles." A bark infusion is drunk to treat serious coughs accompanied by fever, constipation, and it is sometimes applied locally to diaper rashes.

SOLANACEAE
(Tomato Family)

278 137 CAPSICUM FRUTESCENS L.

polo

The pantropical red pepper plant is found around dwellings in Tonga.

278 171 The fruit is official in the Argentine, United States, British, and Indian Pharmacopoeias (21).

278 757 The fruits of this species enter into many remedies in Tonga, especially for treating diseases of the skin. The leaves are chewed, and the juice swallowed as a remedy for tuberculosis. The juice is applied to the eyes in cases of mild conjunctivitis. One remedy for jaundice consists of four fruits and one handful of bark mixed in one pint of water. The patient is advised to sip this solution twice daily until cured.

[p. 445-A]

278 PHYSALIS ANGULATA L.
137 *polo pa*

This herb, an occasional weed in Tonga, is distributed widely in warm countries.

278 Yuncker (32) reports that in Tonga the leaves are used medicinally.

278 PHYSALIS PERUVIANA L.
278 *ku'usi*
137

This pantropical species is an occasional plantation weed in Tonga.

278 In Tahiti parts of this plant have diuretic
278 value and are used also in treating abscesses
171 and for conjunctivitis (19). Quisumbing (21) reports usage in other countries.

278 According to Yuncker (32) the leaves are employed in medicine.

278 SOLANUM UPORO Dun.
polo tonga
137

This plant is occasional in Tonga and occurs also in Tahiti and Rarotonga.

278 Papy (19) reports that in Tahiti the plant
171 is used as a sedative, as a diuretic, for conjunctivitis, and in treating abscesses.

278 A drink made from an infusion of the leaves is used to reduce filarial swellings.
757 The crushed leaves are applied to boils, fungal infections, and tumors of the breast. Because of the wide usage of this plant detailed chemical and pharmacological analysis should be undertaken.

278 **THYMELAEACEAE**
137 **(Akia Family)**

WIKSTROEMIA ROTUNDIFOLLIA (Forst.) Decaisne
lala vao

This species is found in Tonga and Niue.

278 Yuncker (32) reports that in Tonga a physic is prepared from an extract of the root.

278 **TILIACEAE**
137 **(Linden Family)**

TRIUMFETTA BARTRAMIA L.
mo'osipo

The bur bush is frequent throughout Tonga and is found also from Malaya through the Mariana Islands and Polynesia.

278 In the Philippines a decoction of the roots
[171] is used for treating intestinal ulcers (21).
[752] In Tonga the leaves are crushed and applied to burns and scalds.

[p. 445-B]

78: Weiner N-4,5 (1969) 1972
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278
137

ULMACEAE
(Elm Family)

TREMA AMBOINENSIS (Willd.) Bl.

mangele

This tree, occasional in Tonga, is found from South-Eastern China to Australia eastward to Polynesia.

278
[171] In the Philippines the softwood is pounded and the resulting fluid applied as a poultice to swellings (21).

Yuncker reports that in Tonga the leaves are used medicinally (32).

278
137 TREMA ORIENTALIS (L.) Bl.

mangele

This species is frequent in thickets throughout Tonga and is found in other islands in the Pacific.

278 It is reported that in Tonga the leaves are used in medicine (32).

278
137

UMBELLIFERAE
(Parsley Family)

CENTELLA ASIATICA (L.) Urb.

tono

The Asiatic pennywort is found throughout Tonga and is distributed pantropically.

278
171 Hunt (12) reports that the leaves are used medicinally in Samoa. The plant is used medicinally in Niue (31) and also in the Philippines where the sap from the leaves is applied to wounds and the seeds are used for treating dysentery, fever, and headache. This plant is used widely in other countries; as a tonic, as a hypotensive, and as a circulatory stimulant. The leaves are official in the Dutch, French, Mexican, Spanish, Indian, and Venezuelan Pharmacopoeias (21).

278
757 In Tonga the leaves are used as poultices (32), in tonics, and as an infusion for treating convulsions in infants.

278
137

URTICACEAE
(Nettle Family)

PIPTURUS ARGENTEUS (Forst. f.) Wedd. var. LANOSUS Skott.

olonga, tou

This small tree is frequent on cliffs in Tonga and is also found in Samoa and Rotuma.

278
171 In New Guinea, the plant juices are ap-

[p. 446-A]

78: Weiner N-4,5 (1969) 1972
0U9 Tonga 0U9

278 171 plied locally to wounds and used for toothache (27). In the Philippines, scrapings from the bark of *P. arborescens* are applied to boils (21).

278 In Tonga the bark and leaves are valued for medicinal purposes (32).

278 **VERBENACEAE**
(Verbena Family)

137 CLERODENDRUM INERME (L.) Gaertner
tutuhina

This shrub is frequent near the shore in Tonga and occurs also from India through Malaya eastward to Polynesia.

278 171 Hunt (12) reports that the leaves of this species are used in Samoa in treating fevers. In the Philippines, a decoction of the roots is taken as a febrifuge and the leaves are applied as poultices. Quisumbing (21) also reports other usage. The sailors of Macassar employed a decoction of freshly pounded seeds to offset the effects of eating poisonous seafoods—fish, crabs, etc. (21).

278 757 An infusion of the pounded bark is drunk in Tonga as a remedy for liver disorders and in treating ulcers.

278 137 LANTANA CAMARA var. MIST (L.) L. H. Bailey
talatala

This plant is occasional in Tonga and is distributed pantropically.

278 171 In the Philippines a decoction of the fresh roots is gargled to relieve toothache (21). Diguangco (8) reports that the pounded leaves are used to reduce inflammations and that a lotion is prepared for treating rheumatism. He states also that the active constituent—lantanine—is an alkaloid that acts like quinine in reducing fever and slowing circulation.

278 752 In Tonga, the leaves are chewed until moist and applied to cuts. A variation of the above treatment consists of warming the leaves near a fire and then applying the plant juices directly on the cut or wound.

278 137 PREMNA TAITENSIS var. RIMATARENSIS F. H. Br.
volovalo

This species is frequent in Tonga and ranges also from Fiji eastward to the Marquesas.

[p. 446-B]

278 171 In Tahiti, the leaves are used for treating toothache and neuralgia (19), and in Niue, they are reportedly esteemed in treating tuberculosis (31). Hunt (12) reports that the plant is employed in Samoa.

278 757 In Tonga, boiling water is poured over the leaves into a basin and the steam inhaled as a cure for fever and headache. The bark is boiled and is an ingredient in a general tonic.

ZINGIBERACEAE
(Ginger Family)

278 137 CURCUMA LONGA L.

ango

The turmeric plant, distributed widely in warm countries, is occasional throughout Tonga.

278 171 A decoction of the rhizome is used in treating conjunctivitis (8) and a mixture of the rhizomes with coconut oil is prepared as a vulnerary (21) in the Philippines. The rhizomes are official in numerous pharmacopoeias.

278 844 386 A solution of the rhizome was formerly painted on the mother's body prior to parturition as an antiseptic. This practice is no longer common in Tonga. *Ango* is presently found in "brick" form. These bricks are prepared by first removing the outer layer of the rhizome and then pounding the latter and adding water. The fine dye grains are separated from the rough starch grains and the dye grains dried in the sun until they have a "creamy" consistency. This mass is then placed in a bamboo tube and baked in a Tongan earth oven until dry. The circular bricks are removed as needed.

278 137 ZINGIBER ZERUMBET (L.) J. E. Smith

angoango

Wild ginger, widely distributed in warm countries, is frequent in Tonga.

278 171 In the Philippines, the pulverized rhizome is used as an antidiarrheic (8). Stopp (27) reports that in New Guinea juice derived from the rhizome is employed for treating burns or cuts and that small pieces of the rhizome in combination with "other plants" are valued to relieve toothache.

278 Yuncker (32) states that in Tonga the rhizome has medicinal uses.

[p.447-A]

78: Weiner N-4,5 (1969) 1972
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Martin's report on life in Tonga indicates that around the year 1800 few plants were used in treating illnesses (17). There is no reason to doubt his observations. However, the possibility that plants were generally used in medicines before 1800 must not be eliminated on the basis of this single report. Evidence from other regions of the Pacific and from ethnographic studies of primitive cultures in general suggests that plants were used in medicines to some extent by most peoples. By attempting to evaluate the relative date of introduction to Tonga of the species enumerated in Section V, perhaps some conclusion as to the origin of plant remedies in Tonga can be determined. For this purpose, I have divided the 71 enumerated medicinal plants into three categories: endemic, indigenous, and of recent introduction. For the purposes of this discussion, "endemic plants" refers to species found only in the archipelago; "indigenous plants" are those found generally throughout Polynesia and of pre-European introduction; and "recently introduced species" are those from tropical America, Africa, Asia, or India that were introduced after Europeans first arrived in Tonga. Table V lists those species which are indigenous to Tonga and which are used in medicines. Table VI lists those which are used in medicines and which are considered of recent, or post-European, introduction.

Of the species listed above, one is endemic, 49 are considered indigenous or of pre-European introduction to Tonga, and only 21 are of post-European introduction. Therefore of the total of 71 species enumerated, 68% are indigenous to Tonga and 30% are recently introduced. As the majority of enumerated medicinal plants are native or of pre-European introduction to Tonga and the use of plants in Tonga is assumed to have flourished after 1800, it is possible to conclude that the Tongan may have learned the many plant remedies enumerated herein from other Pacific islanders and/or from Europeans who learned of certain plant remedies in their travels and entered the archipelago after visiting these other island groups. It is also possible to conclude that Martin's (17) observations were, in fact, incorrect and that medicinal plants were used by Tongans before 1800. Perhaps the Ton-

[p.448-B]

78: Weiner N-4,5 (1969) 1972
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TABLE V

MEDICINAL PLANTS OF PRE-EUROPEAN INTRODUCTION TO TONGA

278
137

Aglaia saltatorum
Alphitonia zizyphoides
Amylotheca insularum
Artocarpus altilis
Calophyllum inophyllum
Carinta herbacea
Casuarina equisetifolia
Centella asiatica
Clerodendrum inerme
Cordyline terminalis
Diospyros ferrea
Ercatamia orientalis
Euodia hortensis f. *simplicifolia*
Ficus obliqua
Garcinia sessilis
Gardenia taitensis
Geniostoma insulare var. *insulare* f. *insulare*
Glochidion ramiflorum
Guettarda speciosa
Gyrocarpus americanus ssp. *americanus*
Hernandia moerenhoutiana
Hibiscus tiliaceus ssp. *tiliaceus*
Hoya australis
Inocarpus edulis
Ipomoea congesta
Jasminum simplicifolium
Macaranga harveyana
Morinda citrifolia
Phymatodes scolopendria
Piper methysticum
Piper puberulum var. *glabrum*
Pipturus argenteus
Pisonia grandis
Pometia pinnata
Premna taitensis var. *rimatarensis*
Rhus taitensis
Scaevola taccada var. *taccada*
Solanum uporo
Spondias dulcis
Syzygium corynocarpum
Syzygium malaccense
Tarenna sambucina
Terminalia catappa
Thespesia populnea
Trema orientalis
Vigna marina
Wikstroemia rotundifolia
Xylocarpus granatum
Zingiber zerumbet

[p. 449-A]

78: Weiner N-4,5 (1969) 1972
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TABLE VI

MEDICINAL PLANTS OF POST-EUROPEAN INTRODUCTION TO TONGA

Achyranthes aspera
Ageratum conyzoides
Annona muricata
Bidens pilosa
Cananga odorata
Capsicum frutescens
Catharanthus roseus
Curcuma longa
Erythrina variegata var. *orientalis*
Jatropha curcas
Lantana camara
Oxalis corniculata
Physalis angulata
Physalis peruviana
Premna amboinensis
Psidium guajava
Pueraria lobata
Ricinus communis
Triumfetta bartramia
Urena lobata
Wedelia biflora

gan did not exhibit these plant remedies out of respect for the foreigner or for fear that the stranger would bring bad luck upon the patient.

I do not pretend to have collected all of the plant remedies used in Tonga. One agricultural officer bade me farewell with the remark, "Well, I guess you got about 80% of them."

Of the crude drug samples collected, I would suggest that intensive analysis be undertaken for the constituents of *hehea*, *Syzygium corynocarpum*. This species was used by three individual practitioners for treating severe boils or tumors of the breast. *Syzygium corynocarpum* was common to all three remedies, while different plants made up each of the other concoctions. *Solanum uporo* is used widely in Tonga, and it may also be worthwhile to analyze.

Regarding my listing of "medicinal plants," it must be remembered that although the individual plants and their uses are listed separately, in many cases remedies are compounded of two or more species. The possibility that activity of some of these remedies

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78: Weiner N-4,5 (1969) 1972
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278 757 is derived in part from synergistic effects between plants must not be overlooked.

Acknowledgments

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88: Thaman

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262
278
241

[For scattered information on these topics, see Category 137 or 824, pp. 377-431.]

249

Turmeric - ango (Curcuma longa). Turmeric, supposedly of Indian origin and probably Pre-European introduction (Yuncker, 1959: 86) is cultivated and found growing naturally throughout Tongatapu. The rhizome is used in making a yellow dye (enga) and in the preparation of medicines.

[386] [278]

Arrowroot - misimisi koka'anga (Maranta arundinacea). The common arrowroot, a native of tropical America and the West Indies, was probably an early European introduction (Herklots, 1972: 356). It is found only occasionally in a cultivated state on town allotments and is used as a substitute for Tacca leontopetaloides and Manihot esculenta in the preparation of paste for tapa making.

[287]

249 242

Hyacinth bean - piini Tonga (Dolichos lablab). Native to the Old World Tropics and probably introduced (Stone 1970: 333; Parham, 1972: 112), the hyacinth bean is found occasionally on bush allotments planted on fallow land to restore soil fertility. The use of it in this capacity is encouraged by the Agricultural Department. In times of food shortage, the seeds are also eaten.

[262]

249

Kava'aukava or kava Fisi (Derris elliptica). Native to Indomalaysia and possibly a recent introduction from Fiji, kava Fisi is occasionally found in both a planted and a natural state on bush and town allotments. The roots are used to stupify fish (Parham 1972: 111).

[226]

241 369 Table 50. Continued.

Scientific Name	Nuku'alofa	Rural	Total
Nicotiana fragrans	1	0	1

241 824 a number of varieties of Pandanus (tofua, tapahina, paongo and kie), as well as Gossypium brasiliense, Coix lachryma-jobi, Broussontia papyrifera, and Maranta arundinacea. 241 824 278 Also of considerable importance were plants used for traditional house and body ornamentation: Gardenia spp., Coleus amboinicus, Hedychium spp. (tevunga and teuila), and Artabotrys uncinatus; and for medicinal purposes: Achyranthes aspera, Zingiber zerumbet, Vigna marina, Curcuma longa, Jasminum spp., Piper puberulum, and Wedelia biflora. [226] The others are all used in some way (Appendix E), such as Derris elliptica, which is used for stupefying fish. 241 369 Although there is a considerably higher frequency of non-food plants than food plants on rural town allotments, there is still a higher frequency of these plants on Nuku'alofa town allotments.

Important Tree Species

241 Fruit Trees

245 369 Fruit trees were the dominant vegetation type on most town allotments, both in Nuku'alofa and in the rural

A [See Category 116, pp. 377-431--Analyst.]

241 178 traditional plants and trees to recent introductions. This is already evident in the increasing importance of manioc, American taro, and sweet potato as well as in the increasing cultivation of peanuts, watermelons, pineapples, garden 278 824 [178] vegetables, and improved banana clones. Although still of widespread importance, the use of traditional folk medicine is gradually giving way to an increasing acceptance of modern medicine. Consequently, the great range of plants and trees used for this purpose may become more expendable. 824 178 A similar trend exists for trees once valuable for scenting coconut oil, cordage, dyes, soap substitutes, and fish poisons.

241 137 178 An even more pronounced trend, is the replacement of native secondary vegetation by exotic species due to the continual reduction in the duration of fallow periods. The native forests have had insufficient time to re-establish themselves and the more hardy introduced pioneer species are now the dominant vegetation on almost all fallow land 241 on Tongatapu. This rapid expansion of weedy vegetation is a major problem limiting agricultural production. In addition to their inferior ability to store soil nutrients, their removal often constitutes a very high labor input, and in some cases, because of their increasing occurrence after the extension of cropping periods, cultivators are [171] often forced to shift to new plots. Watters (1958:344) found this the case in Samoa, where, after three successive

/41 cont./

346 The construction of some schools and especially of many dwellings
342 built in the European "shanty style" also leave much to be desired
362 from a health standpoint (for example, uninsulated corrugated iron roofs), there having been as yet no effective remedy.

757 The Tongans are largely indifferent to the health service. In most cases of illness they first try self-healing with ancient Tongan herb medicines and massage, sometimes with a small admixture of magic, and if this does not help and the case seems very serious, they go to the doctor. At the same time, there are a few /42/ natives who run to the doctor with a headache or a slight stomach upset, as well as a few who do without any kind of medical help. (92)

92. On Nomuka the author saw a woman who, after eating a poisoned shark liver, was very ill and, despite grave danger, did not wish to see the assistant doctor who lived only 300 meters away.

[743] In places where an auxiliary hospital or "dispensary" /cited in English/ is situated close by, the Tongans are beginning to come in with
757 minor cases (coughs, constipation, diarrhea, cuts, boils). The Tongan
177 physicians regard the present situation as being a considerable improvement over the condition 40 years ago. A certain change has
[656] surely taken place in the last decades. Thus the old Tongan healing art (93)

93. Various elements of the Tongan healing art were borrowed from the natives of the Fiji Islands (for example, Martin, loc. cit. II. p. 242.)

which was not always fortunate, (94)

94. A series of spontaneous attempts at healing often took the place of a diagnosis.

was forbidden by a governmental law and was also virtually repressed
278 by the growing European-type health service. However, some of the
178

/42 cont./

278 178 old Tongan medicines and methods of treatment still hold their own more or less successfully in most families, and there are even Tongan [759] doctors who apply them when pills fail. Whereas a few of the simpler herbal medicines are familiar to many Tongans and can be easily prepared if necessary, most of the remedies are known only to certain "experts" (male as well as female) who have inherited their knowledge and whom people like to consult for advice and help.

757 As examples of surviving Tongan cures we mention the following treatments. (95)

95. From Sione Matoto on Nomuka, 1952.

Some of these have lost their ancient links with the belief in spirits and magic, (96)

[113] 96. Cf. Martin, loc. cit. II. p. 240ff; E.E.V. Collocott, "Sickness, Ghosts and Medicine in Tonga" /cited in English/ in Polynesian Sociological Journal, vol. XXXII, no. 3. 1923. pp. 136-142.

and are regarded simply as useful medicines, especially by younger and middle-aged natives.

1. Headache. Take six leaves of the tutu'uli and tear each leaf in half. Either the left or the right halves are used, depending on the side of the head that pains the patient. These halves, wrapped in a clean white piece of tapa are chewed and then squeezed out on the patient's eyes and nose so that the liquid runs into both eyes and nostrils. If the diagnosis has been correct, the patient will feel better in a few minutes.

2. Headache (recurring, but only at specific hours of the day). [826] The man (or woman) administering the treatment uses the sole of his or her left or right foot, corresponding to the aching side of the patient's head, and with it very gently touches the affected part. Then the head of the patient is massaged with uhi leaves (Evodia

/162 cont./

824
178
[372]
[752]
[524]

(old); serves to deep fire smoldering (old); as fuel (old). "Towel" (old), "toilet paper" (old) and to clean shoes (new): the fibers are also used to press out the grated coconut meat (old); the juice of green, warmed husks and the crumbly material between the fibers of old husks are used to treat wounds (old); used for making children's toys (sailboats) (new?).

[352]
[285]
[372]

5. The palm leaves (lou niu): used, as is, to sit on in the bush (old); used to make floor mats (takatapu) (old), fans (old), baskets (old), hats (for example, helemeti and tata faka-polis) (new); needed to make house walls and roofing (old); used in dry form as fuel (old).

[285]
[287]
[412]

6. The center rib of the leaflets (tu'a niu): used in plaiting baskets (old) and fans (old) and in making tapa stencils (see p. 328); used in making brooms (old).

/163/

[482]
[372]

7. The leaf stems (tome): used as carrying sticks (see p. 250) (old); in dry state as fuel (old); also used to keep fire going (smoldering leaf stem wound with tapa) (old).

[287]
[415]

8. The bast fiber at the base of the leaf stem (kaka 'i niu): used to make tapa stencils (under side) (old) and as a bag for squeezing medicines and food (old).

[313]

9. The wood or the trunk (sino oe niu): used to make rafters and roof laths (old); used as posts and beams in houses (old?), as single posts on the plantations and for palisades (old).

[278]

10. The bark (kili oe niu): used to make medicines (for stomach pains) (old).

[227]
[278]

11. The roots (aka oe niu): used to plait fish baskets (traps, finaki) (old) and to make cuttle fish hooks (tailpiece) (old); the juice of roots serves as medicine for abdominal pains and headaches (old).

it maybe designated as the most useful plant of the /163/ Tonga Islands.

245 Cook reports that he came across coconut palms on Tongatapu "in astonishing numbers." (427)

427. J. Cook, Beschreibung...loc. cit. VI. p. 237.

105: Vaea & Straatmans G,I-3 (no date) 1954
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are dropped and sometimes they follow the withdrawn bait to the surface where they are speared. 226

(c) *Ama* is spearing fish in the night by torchlight.

5.—Line Fishing.

(a) *Ordinary line fishing* is an old Polynesian method of fishing although with very primitive equipment.

(b) *Fakatele* is trolling a fishing line and hook from a moving boat.

(c) *Seuseu* or *Heuheu* is trolling a fishing line on the surface of the water. The fisherman stands on the edge of the reef and pulls his line from right to left and back again with a very long stick to the end of which the line is attached. The moving hook and bait attracts the eyes of small fish which rush and swallow the bait and hook and are caught without much difficulty. *Huli* is the species usually caught by this method.

(d) *Tautu'u* or *Tautukutuku* is a method of line and hook fishing whereby the boat does not actually drop anchor but drifts over a certain area whilst the fishing line, being weighted by some objects, for instance a piece of iron, is dropped over the side of the boat. The line tends to sink directly under the boat in spite of currents. On touching the bottom it is hauled up to a certain depth to allow the hook to hang just close to the bottom but not actually lying on the sea bed.

(c) *Taulamata'u* or *Taumata'u* is ordinary line fishing whereby the boat is actually anchored. The hook and line is not weighted but is thrown out to be taken away by the current and the hook and bait stop; the smell of the bait is carried far away by the current to lure the fish to the bait.

6.—Other Fishing Methods.

(a) *'Aukava.* This method is the actual poisoning of fish. The flower of a tree called *masi*, after being cooked in a Tongan oven, is spread on the water to poison the fish in a small bay or inlet. The fish, being poisoned, are forced to come to surface gasping for air. They finally sink to the bottom dead. [824 276]